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THE OCCURRENCE OF THE WARBLE FLY *HYPODERMA BOVIS* DE GEER IN CANADA.

BY C. GORDON HEWITT, D.SC., F.R.S.C., DOMINION ENTOMOLOGIST, OTTAWA.

In the early writings on the Warble Fly occuring in the United States, the species was constantly referred to as *Hypoderma bovis* of de Geer, which was supposed to be the species common to Europe and North America. Curtice, in 1891, concluded that the American species was *H. lineata* Villiers, and not *H. bovis*, and Riley in the following year (Insect Life, Vol. 4, pp. 302-317, 1892) discussed the question fully, and concluded that "the older Ox Bot-fly, *Hypoderma bovis*, hitherto supposed to be a common species of both America and Europe, is in reality either a very rare insect in this country, or possibly does not occur here at all." Aldrich (Catalogue of North America Diptera, 1905) states that *bovis* is not positively known from North America.

Subsequent workers on this continent have been accustomed to refer only to *H. lineata* in speaking of the North American species.

Brauer described *H. lineata* Villiers as *H. bonassi* from the larva only, specimens having been obtained in Colorado from the American buffalo. Besides being generally distributed through the United States, according to Riley, it also occurs commonly in Europe. Walker described it from Nova Scotia in 1853 as *Oestrus supplens*.

During the summer of 1912 Dr. Seymour Hadwen, in charge of the Branch Laboratory of the Health of Animals' Branch of the Dominion Department of Agriculture located at Agassiz, B.C., carried out a series of experiments on Warble Flies, and his important contribution to our knowledge of the biology of these insects has now been published (Bull. No. 16, Health of Animals' Branch Dept. of Agriculture, Ottawa). Dr. Hadwen made the interesting discovery that the common species of fly under observation was *H. bovis*, and all the full-grown larvæ collected at Agassiz,

B.C., both from local animals and from cattle imported from Eastern Ontario, in the previous December, were also *H. bovis*. Two larvæ collected at Mount Lehman, B.C., proved to be *H. lineata*.

As this discovery of *H. bovis* in Canada was of unusual interest, I examined the specimens of the collection of the Division of Entomology. The genus was represented by four specimens, which appeared to me to be *H. bovis*, but in order to be certain I submitted them to Prof. G. H. Carpenter, of Dublin, Ireland, who kindly examined them, and states that they are all *H. bovis*. These specimens are from the following localities: New Cornwall, (Lunenburg Co.), N.S., 1913; Brockville, Ont., 1913; St. Henri Levis, Que., 1911; and Southern Alberta, 1910. Our collections also contain larvæ of *H. bovis* from East End, Sask., 1913, and of *H. lineata* from Sarnia, Ont.

In view of the fact that *H. bovis* is evidently widely distributed in Canada, occurring, as our records indicate, from the Atlantic to the Pacific, it would appear to be extremely probable that this species occurs with *H. lineata* in the United States. The economic importance of the species renders the state of uncertainty of the presence or absence of this species all the more remarkable, and further investigation would be very desirable. The adults of the species have distinctive characters. *H. lineata* is smaller than *H. bovis*, it has black hairs on the head and on each side of the prothorax is a tuft of whitish hairs; the disc of the thorax is almost bare and striped longitudinally. The hairs on the head of *H. bovis* are yellow and a band of yellow pubescence stretches across the thorax in front. The larvæ are readily distinguishable by means of the spiny cuticular armature. Mr. C. W. Johnson reared *H. bovis* from larvæ obtained in June, 1910, at Manchester, Vt. (Psyche, XVII, Dec., 1910, p. 231).

ON THE PREDACEOUS HABITS OF *SCATOPHAGA*: A NEW ENEMY OF *MUSCA DOMESTICA*.

BY C. GORDON HEWITT, D.SC., F.R.S.C., OTTAWA.

In view of the increasing attention which is now being paid to the character of the prey of certain groups of Diptera, the following notes on the feeding habits of *Scatophaga stercoraria* L. will be of interest, apart from their economic significance. While

it is known that certain of the flies of the family Cordyluridæ prey upon insects which they capture, the common yellow coprophilous *S. stercoraria* is not usually regarded, so far as I am aware, as a predaceous insect. Yet the observations recently made and forwarded to me (30 Oct. '13) by Mr. George E. Sanders, in charge of the Dominion Entomological Field Station at Bridgetown, N.S., would indicate that this common species destroys, in the aggregate, no small number of other Diptera, especially Muscid flies, for which it appears to display a preference.

Specimens of *S. stercoraria* were found and taken by Mr. Sanders capturing *Musca domestica* L., *Calliphora erythrocephala* Mg., *Stomoxys calcitrans* L., *Fannia canicularis* L., *Pollenia rudis* Fab., and *Orthellia cornicina* Fab.* After seizing their victims, they wrapped their legs around them and the neck of the victim was then pierced from below by thrusts of the proboscis and sucked for a short time. The body was afterwards turned over and the proboscis inserted between the abdominal segments, in which position the fly continued to feed for a long time. In some cases, for example, *Pollenia rudis*, the victim's head was completely broken off.

S. stercoraria was also seen to capture *Bibio longipes* Loew, and a female of *S. merdaria* Fab. was caught preying upon *Scatops notata* L.

Mr. Sanders reports that *Scatophaga* has been seen catching *Musca domestica* on the porch of a house, and, when observing the flies attracted by the sugar bait at the laboratory, it was a common sight to see *M. domestica* captured by *Scatophaga*. A "yellow fly." probably this species, was reported to him as capturing and eating mosquitoes.

The preference of *Scatophaga* for Muscid flies is noticeable. This may be due to the fact that excrement has an attraction for both prey and victims. *S. stercoraria* breeds in excrement and commonly frequents it; *M. domestica* and certain of its allies have similar habits. The significant fact, however, is that *Scatophaga* preys upon *M. domestica* and other common Muscids, not only when they are visiting excrementous matter, but in other places, and these facts place *Scatophaga* in the category of decidedly useful insects.

*I am indebted to Mr. C. W. Johnson for assistance in determination.

THE CHRYSOMELIANS OF ONTARIO.

BY F. J. A. MORRIS, PETERBORO', ONT.

(Continued from Vol. XLV, p. 392.)

On these same raspberry leaves is often found a small yellow beetle with black thorax ornamented by two white spots; it frequents many other leaves besides, such as basswood and hazel, but it is most abundant on raspberry. It is *Bassareus luteipennis*, the first of seven genera that constitute Tribe VI. These seven genera contain over 100 species, about 50 being found in Ontario. Three of the genera, containing over 35 species, are represented right in this wood. *Bassareus* on the raspberry, *Cryptocephalus quadrimaculatus* (the size of the insect as usual in inverse proportion to its name) on the young shoots of white pine where the needles are soft, and *Pachybrachys* on the willow shrubs at the lower end of the wood. The members of this tribe are small, sometimes minute, and stoutly cylindrical in shape, what we would call "chunky"—indeed, *Pachybrachys* (the Greek for "thick-short") is only a grand name for "chunky." Some of the species of *Cryptocephalus* (which means "hidden head") are very pretty, especially *venustus*, which I have found on the blossom of the meadow-daisy, and *mutabilis* taken on birch and spiræa.

As we walk back to the road that we left at Mose Robinson's, we can collect no less than 5 genera of the next or VIIth Tribe. In the hollow at the north-east of the wood, where the clump of willow and dogwood grows, you will find *Xanthonia* on the leaves of the former and *Adoxus* on those of the latter; the first a small and the second a medium-sized beetle, closely resembling each other in shape and general colour; about the trunk and limbs of that newly-felled pine on the bank, *Glyptoscelis*, a fairly large beetle, metallic brown in colour, but looking lighter from its pubescence; on the common Dogbane (*Apocynum androsæmifolium*) you will find *Chrysochus aureus*, a large dazzlingly brilliant bluish-green beetle; it is said to feed on Indian hemp (*Apocynum cannabinum*) and on Milkweed (*Asclepias*), but I have never found it on any milkweed nor on any other species of Dogbane than the common, sweet-scented species with pinkish blossoms; *Apocynum cannabinum* has greenish-white blossoms and no scent; as the Dogbane is filled with a white milky juice just as abundant as that of the

Milkweed, Blatchley's description may be erroneous; on the dogwood, again, both leaves and blossom, a fifth genus of this tribe (*Colaspis*) is often found.

Returning to the road just east of Robinson's we face east. South of us lie two upland meadows of rough grass, somewhat rocky and covered with hummocks and watery hollows, a favorite place for the Kill-deer plover; here, too, sometimes in the fall is heard the peculiar cry of the Yellowlegs. As I was walking along here, at the end of last April, I heard a strange bird-note—a long, loud whistle, melodious and with something of the plover's plaintiveness about it. After some time I discovered a bird with long narrow wings circling at some height over the meadows, and several times the strange cry was repeated. I brought a friend out with me next week and, with the aid of a field glass, we watched as many as three pairs of the birds feeding, running and flying about these meadows. On alighting, they would raise their wings over their backs till the tips met and then slowly fold them down at the sides, at the same time uttering this long-drawn whistle. The bird I had first heard, however, was certainly calling as it hovered and circled high over the field, and as I stood under it I distinctly saw its neck and wings grow rigid for a moment as it forced the cry out on to the air; it was the Bartramian Sand-piper, and this was its mating call. I had the luck to startle a hen bird off her nest of eggs early in May quite near the fence that we are going along. Once the eggs are laid the birds become very shy and can rarely be approached. But in the mating season they seem fairly tame and we watched one settle twice on the top of a fence-post just north of where we are now, within stone's throw of a farmhouse. I was standing in the roadway at the time and my friend was at the snake-fence, his foot on the bottom rail and his field glasses resting on the top, when I noticed a weasel running along the bottom rail in our direction; it showed not the slightest fear and never hesitated, but, advancing steadily, stepped right over my friend's foot; in its teeth it held by the nape of the neck, limp and lifeless, a large field-mouse, doubtless the family dinner. These creatures are very bold and show the utmost unconcern of human beings. I remember being stopped some years ago by a section boss on the railway, who asked to show me a nest under a culvert that his gang had been cleaning out

"There," he said, disclosing four little blind nestlings, "what's them?" "Why," I said, "they look like weasels." "That's what they are, I reckon," came the answer, "and the mother fought like a good one for nearly an hour to get back to them. We had to drive her off with stones before we could get at work on the culvert."

Along this stretch of road, within the space of a few rods, we shall find no less than 5 genera belonging to Tribe VIII on our list. Under chips of wood by the roadside in the early spring I have frequently found a small beetle, variegated black with yellow brown stripes, called *Prasocuris;* on the common milkweed the large handsomely marked orange and black *Doryphora clivicollis* and on the bittersweet growing over that stone-pile, its cousin *Doryphora decemlineata,* that ubiquitous pest, the Colorado potato-beetle; in the blossom of the dogwood, a small metallic dark green beetle that feeds also on elm leaves, *Plagiodera viridis;* about the knotweed at the wood's margin, the pretty little *Gastroidea polygoni* with yellow brown thorax and peacock-green elytra; while in the grass, a little further on, I took two specimens of *Lina scripta* as early as the end of April; no doubt hibernated specimens, probably from the willow clump nearby, for that is the favourite food plant of the *Lina scripta:* it is a somewhat variable species, of which I have found two quite distinct forms on the willow—one the normal form at Guelph and the other near Lindsay. There still remains in this tribe a genus that I have so far left unmentioned, the most beautiful of all the family and well worthy of the high compliment (*pace* the economic entomologist) paid it by naturalists—*Chrysomela* (Golden Apple)—or is it an Homeric word, meaning "golden sheep?" from which the tribe gets its name of Chrysomelini or Chrysomela-like beetles, and the whole family its name of Chrysomelidæ; the scions or clan of Chrysomela. This is a most beautiful beetle; the characteristic appearance being roundish-oval in shape and decidedly convex above; head and thorax mostly dark metallic and wing-covers a creamy white, daintily sculptured with metallic greenish or bluish black. It suggests old ivory inlaid with ebony or jet. In the early days of collecting, this was a beetle I coveted more than any other; the species that above all took my fancy being *Chrysomela scalaris.* There was a brother-collector in town whose cases I was continually poring over. But

it was in my second season as a collector that I first had the luck to "strike ile," and it was right on that dogwood bush behind the north fence of our road. I found here several specimens of a *Chrysomela* rather smaller than *scalaris* with greenish-black head and thorax, elytra cream-coloured and finely sculptured and dotted with metallic greenish black; it proved to be *Chrysomela philadelphica*, and a short search anomg dogwood shrubs yielded me some 50 specimens of the beetle. This was at the end of June, and in July I migrated with all my bug-and-weed paraphernalia to the Rideau Lakes. It wasn't long before I found grazing on basswood leaves, along with walking-stick insects, whole flocks of a small whitish larva, marked with black, somewhat louse-shaped and so strongly resembling the larva of the Potato-beetle that visions of *Chrysomela scalaris* began again to float before my excited imagination and to haunt my dreams. I separated about 15 of the best-grown lambs of the flock and shepherded them home to a domestic fold. But they seemed to scorn captivity and quite obviously pined in their cardboard box. Twice a day I brought them fresh fodder from their native pasture, but they wouldn't browse worth a cent, and I lost one or two with every moult; less than half a dozen reached maturity, and of these two died in pupating. However, three emerged safely and proved the realization of my dream, *Chrysomela scalaris*, all the more lovely in being home-grown. The knowledge that hundreds of these creatures must have matured about basswood trees where I had made my captures drew me out to their feeding grounds again. This time I searched in vain, not a larva could I see on any of the leaves, still less a mature insect, for the full-fed larva in this genus drops to the ground in order to pupate, and though it was the beetle itself that I had found gregarious on the dogwood, there seemed to be no such luck in the case of this species; at the end of two hours I was still empty-handed. It was when I was passing across a stubble-field in the open, from one part of the edge of the wood to another, that I felt something crawling on the back of my neck. Of course, gentlemen, you all know the extraordinary phenomenon of an insect crawling on the back of the neck. No matter how rare it may have been when it first settled, if once you reach with your hand to make a capture it nearly always—well, if you wish for an exact figure, in

ninety-nine cases out of a hundred—it turns into an aculeate hymenopteron and poniards the cord of your neck with that most venomous of stillettos, the wasp sting; in the hundredth case, of course, it simply flies away. I was on the horns of a dilemma: if that creature was *Chrysomela scalaris*, I wanted it badly; on the other hand, I stood good chances of being stung, literally or figuratively, by its proving a wasp or something worthless or making its escape. My embarrassment was worse than that of the Cockney sportsman (as pictured by Punch) when the bird he was aiming at suddenly settled on the middle of his gun-barrel; because, though I am told this would make a very difficult shot, at least the man knew what he was trying to bag. There were big risks, it was a daring shot, but I took it and grabbed the insect as it was pushing down behind the collar of my negligé. An awful moment, while I waited for telegraphic communication from my neck to my inner consciousness of the sensation of five inches of hatpin jabbed viciously into the quick and centre of one's being, that matter-of-fact people call a wasp-sting; but there was no telegram, this was was the 100th chance, and sure enough, when I came to examine my capture, it was what I had been looking for—*Chrysomela scalaris*. Where had it come from? I am certain there was none on the basswood; it had simply dropped out of pure cussedness on to my head, I presume, from the sky. Next season I found three more species—one on willows very like *Chr. philadelphica* of the dogwood, but with the front and sides of the thorax margined with cream; I have taken a great many specimens of this beetle in various places, always on the willow; it is *Chr. bigsbyana*. The second new species was a smaller member of the genus called *Chr. elegans*, first found early in the season crawling on railway ties, which are not its food-plant, but afterwards found feeding in abundance on water smart-weed about the surface of a stream a couple of miles south-east of here. There is another species of small size closely resembling this, called *Chr. suturalis*. I have never discovered the food plant to which this beetle resorts about Port Hope, but I have twice found a stray specimen on grass blades. One year in August, when I returned from my holidays, I was looking over my friend's collec-lection of Chrysomelas, mentally checking off their food-plants as

my eye roved from species to species; basswood, dogwood, willow, water smartweed and so on, when suddenly my attention was arrested by a whole row of fine specimens of this beetle. "Hullo!" I exclaimed, "where did you get these?" "Oh, on the beach, just a few days ago." In an instant I had registered a silent vow and next morning hastened off to fulfill it in our old stand-by, the North Wood, equipped for the sacrifice with some sandwiches and a cyanide bottle. All the morning I searched beech trees diligently, without success, and all the afternoon the same, and at last went home, weary and footsore, having got nothing but aching eyes and a stiff neck. In the evening I was round again at my friend's collection. "Are you sure that you got those beetles on the beech?" "Oh, yes, and they were in fine condition; in fact, one of them was still alive. I guess a thunderstorm the day before had blown them out over the lake; when I went down, the southeast wind was washing them up on the beach." My beech, with an "e," was his beach with an "a"; he had taken his specimens on the lake shore. Disappointments like these are bound to occur; I have spent days in search among spiræa and hazels which the collectors say are the invariable food of certain species, and so far the result has been an absolute blank.

We will now move east about a mile, past Davison's old chair factory on the Rice Lake Road, up hill, down dale, and up hill again as far as Bethel. Here we turn south down a grass lane to a wood of pine, oak and maple and skirt along the edge of this wood, keeping close to the fence. Notice that sandy knoll in the wood, just west of us, with a large burrow at the top; I was approaching this one day from the south, gathering morels as I went, when I felt that curious sense of being watched that we sometimes have. Looking up, I saw what I took to be a young collie dog, reddish-brown, sharp-faced, staring straight at me; as soon as it saw me look at it, it made a movement that is very characteristic of the collie, dropped flat on the ground, its head couched between the outstretched fore-paws and so lay, alert and watchful; I took a pace or two forward, when suddenly it did what no collie ever did—dived headlong into a sand-burrow and disappeared. It was a puppy, to be sure, about half grown—a young red fox.

A quarter of an hour's walk southeast brings us to our favorite lunching ground—a huge pine tree surrounded by glacial boulders right at the top of a steep slope facing south; for we are on a table-land here, some 300 feet above Lake Ontario, with a magnificent view, east, west and south. This is probably the old shore line of Lake Ontario—indeed, a few miles west there are clear traces of an old beach five or six miles north of the Lake's present boundary. The top of this hypothetical cliff overlooking an ancient Lake Ontario is clearly marked east and west by its fringe of white pine. East of us there must have been a magnificent bay, for the edge of the tableland recedes in a sharp curve for nearly a mile north, and then comes forward again with a sinuous sweep to the east. Out of the two corners of this bay now proceed southwest and southeast two little trout streams whose union half-way down the sloping valley results in Gage's Creek, a stream that meanders along through five or six miles of level farm land and at last reaches the lake just east of Trinity College School.

After lunch we descend the slope to a rough meadow at the foot on the edge of a tamarack swamp. Here we can examine some genera of Tribe IX of Chrysomelians; on the golden-rod, which earlier in the year was badly eaten by the larva of *Trirhabda canadensis*, we see the mature insect—a large soft-winged beetle of a yellowish colour with a black or dark grey line on the outside of its wing covers and a sutural stripe of the same down the centre of the back. Later in the year you will find two species of *Diabrotica*, commonly known as the spotted and the striped kind, respectively, of Squash beetle, their favorite food (especially in the larval state) being cucumber and melon vines. A third genus of this tribe I got two specimens of, on the edge of the swamp south of this meadow, but I only once have found it abundant, and that was in the Algonquin Park, in a marshy bay at the shore of Cache Lake. It is said to be rare, and Blatchley states its food-plant to be Arrow Arum (*Peltandra*). I found hundreds of it, feeding on a small species of the Skull Cap or *Scutellaria*; it is oblong, soft-winged, light yellow-brown in colour, with two black patches on each wing-cover—a small one at the base and a large one near the apex—its name is *Phyllobrotica discoidea*. One more genus is represented here—*Galerucella decora*—on the willow, and *luteola* on elm shoots

at the west end of the meadow; a third species, *nymphea*, is found on lily-pads; some species are quite a pest, appearing in immense numbers and destroying a great deal of foliage.

We will now walk west, along the north end of Holdsworth's farm, to the road that runs south between Holdsworth's and a farm of John Hume, the Port Hope seedsman. After crossing the road, we come to a little brook; on the water smartweed that grows in this stream I found three or four years ago quite a number of medium-sized black and light-brown striped beetles that worked a new trick on me in methods of escape and with considerable success. I was used to beetles that took to flight suddenly and also to beetles that dropped from their perch on leaf or plant into the tangle of vegetation below, but, except for the small flea beetles of grape-vine, alder, turnip, horseradish, and so on, I was not prepared for jumpers. But this whole Tribe X consists of jumping beetles, and their hind thighs are greatly thickened in consequence. Their name, Halticini, is taken from the genus *Haltica* or Flea Beetle; the name simply means "the jumper." This beetle of the water smartweed is *Disonycha pennsylvanica*. A much larger beetle of the same genus I have found often on willow bushes by the railway near Carmel, 12 miles north of Port Hope, and also at several points in the Algonquin Park; it is light yellow-brown, with a black margin round each wing-cover and a black stripe down the middle of the same; thighs and abdomen orange-coloured; it is *Disonycha caroliniana* and a most active leaper. There is one more genus of these leapers that I have found, said to be uncommon in Ontario; it is a very pretty beetle of fair size, with a close superficial resemblance (in size, shape and colour) to *Chrysomela lunata*; reddish brown all over, this colour, on the elytra, being broken into irregular stripes by narrow wavy lines of yellow. I have found it abundant on the north shore of the Upper Rideau, feeding always on the Fragrant or Canada Sumach. Blatchley describes it as "common on the sumach," but I have never found it on the poison ivy or the stag horn's "only the fragrant sumach, which is a small shrub," about the size of a gooseberry bush, having leaves almost identical with those of the poison ivy—i. e., divided into three leaflets and slightly toothed on one or both margins; the bark and wood are fragrant, but with a certain pungency, not altogether pleasant.

I shall never forget the time and the place that I first found this beetle—*Blepharida rhois*; for I got that day several treasures—this new beetle, a new fern (the ebony spleenwort), the rock selaginella, a new tree (the red cedar) and a new shrub (the Canada Sumach).

We are now on our way home. First we strike south-west for a couple of miles, through fields and woods; just before we reach the Sowden farm, we pass through some stumps of basswood, round whose base a sheaf of leafy twigs has sprouted. On these leaves I have found a smallish wedge-shaped beetle, reddish-brown in colour, with some small, darker marks on it; its surface is peculiarly striated lengthwise by alternate furrows and ridges. It is called *Odontota rubra*, a leaf miner, feeding between the upper and the under surfaces of leaves and often in the larval stage very abundant on basswood; it is the only representative of Tribe XI known to me.

At the Sowden farm we turn west on the old York coach road from Toronto to Kingston and pass presently through Dale or Bletcher's Corners. Arrived at the railway track, we go south along it to the Iron Bridge over the Ganaraska at the head of Corbett's Pond. Just before we cross, you will notice on the steep embankment to our right hand a great growth of wild convolvulus or Morning Glory. It was here that I first found the *Coptocycla aurichalcea*, a little tortoise beetle of most marvellous brilliance; it looks, when seen alive on its food-plant, like a dewdrop sparkling in the sunshine and equally iridiscent, but this dazzling lustre fades after death to a red gold. It was on the south shore of the lower Rideau that I first met this last tribe of the Chrysomelidæ, the Tortoise beetles. Feeding together on wild convolvulus, meadow rue and one or two other plants by the margin of the lake, I found two sorts of beetle—one large and the other small. There were larvæ, as well as beetles of both kinds, on the same plant and often on the same leaf. They proved to be *Coptocycla guttata*, a less brilliant beetle than *aurichalcea*; and *Chelymorpha argus*. I took some larvæ and pupæ as well as imagoes home with me and watched them mature. These insects have devised a most extraordinary means of protecting themselves. From the end of the larva's abdomen protrudes what naturalists are pleased to call a forked process; on this minature rack the creature's moults are spread and converted

into a sort of tarpaulin by liquid excretions; this is then retroverted and dangles over the creature's back like an umbrella. I wonder if any of you ever came across an old book called the "Voyages and Travels of Sir John Mandeville?" This mediaeval De Rougemont, borrowing some of his choicest traveller's tales from Herodotus, Pliny and others, describes a one-legged race of men in Africa who go so fast that (as the author justly observes) it is marvellous. As disuse leads to atrophy, much use produces hypertrophy, and Mandeville declares these one-legged men have developed such enormous feet that in the heat of the day they sit on the sand and hold their foot as a parasol over their head. In my edition of the work there is a woodcut illustrating this description, in which a native is seated on his one haunch (how to balance one's self must be as great a problem with that race as Columbus tackled in the hen's egg) shading himself from the sun with his foot over his head.

Some naturalists think that these larvæ are seeking protection from the sun in spreading this forked process over their back. But it seems more likely that they do it to escape detection by some bird foe for whom they would be a dainty morsel. What makes me think so is that the pupa, too, is protected in a curious way. The full-grown larva pupates attached by some silk thread to the leaf, more or less exposed and helpless, but, as soon as the pupa forms, almost its entire surface turns greyish or bluish white; it looks like a creature that has died and been attacked by fungus-growth of mildew. It so deceived me that I was on the point of throwing specimens away. It was only when I took one between finger and thumb and felt it writhe firmly under my touch that I realised the deception. Doubtless one more case of protective mimicry.

Now, gentlemen, we are nearly home. We skirt the side of Corbett's Pond, where in May you will sometimes find on the mud flats seven or eight species of plover and sandpiper at a time and, passing along Hope Street, turn up a lane near the C. N. R. bridge at Ontario street. This takes us to DeBlaquière street, and one block down brings us to the plantation of young trees sent from Guelph to Trinity College School a few years ago. Here we cross the cricket ground and gain the school, my home for more than twelve years. We have been out all day and walked some 15 miles and I seem to have done a great deal of talking. I only hope I have not wearied you.

AN UNDESIRABLE FOREIGNER ON THE AMERICAN CONTINENT (*CRYPTOCOCCUS FAGI* BAERENS).

BY R. W. BRAUCHER, KENT, OHIO.

The writer received a letter dated Oct. 2, 1913, from Mr. L. G. Vair, the Manager of the Canadian Davey Tree Expert Co., of Montreal, which reads in part as follows: "I am mailing you under separate cover a piece of bark cut from a common beech tree which is covered with what looks to be some form of insect. I hope you will be able to identify it and give its full history and control. If it is an insect, I should think it would be hard to control by spraying. The trouble is noticeable all through the woods in the vicinity of Halifax, N.S., and the whole trunk area will be covered just as the specimen is, as will also most of the limbs. It seems to be killing out the beech trees quite rapidly, and is really a menace which something should be done to exterminate."

The specimen was received in due time, but the writer was unable to find anything like it described in American literature, but on pages 234 and 235 of A. T. Gillanders' "Forest Entomology" he found a good illustration of the specimen sent and a description of the pest and its work.

Specimens were sent to Dr. L. O. Howard for verification of the determination, and he reports under date of Nov. 6, 1913, in part, as follows: "I have referred this material to Mr. Sanford, who is of the opinion that it is the European felt scale (*Cryptococcus fagi* Baerens). So far as I am aware, this is the first report of the occurrence of this coccid in North America, and its presence in Nova Scotia is a surprise to me. Doubtless it has been imported on European stock, and measures should be taken to prevent its becoming widely distributed."

Gillanders (page 235) says: "This insect confines its attacks exclusively to the beech (*Fagus sylvatica*), and, by reason of its whitish appearance, must not be confounded with the various species of *Chermes* (Aphidæ) on larch, silver fir, Weymouth pine, etc. It should also be noted that the 'Copper beech' is all but immune from this insect pest. In fact, I have occasionally seen cases where the copper beech was grafted on the common beech, of the pest appearing fairly thick on the stock or common beech

portion, and the copper beech portion above having only here and there the smallest possible speck on it."

The "copper beech" is probably the purple beech (*Fagus atropurpurea*). *Fagus sylvatica* is the common European beech and the specimen from Nova Scotia is doubtless from the American beech (*Fagus grandifolia* Ehrh.), an entirely new food plant for it. If this is the case and it acts like many of our foreign neighbors when they land on our shores, we may have a serious problem on our hands unless prompt measures are taken for its extermination.

From Mr. Vair's report of the conditions in the woods around Halifax, it would appear that this new pest is taking kindly to its new food and new climate. If it once becomes thoroughly established in our beech woods and thrives as it promises to do, it is impossible to foresee the damage that it may cause.

NOTE ON THE OCCURRENCE OF THE FELTED BEECH COCCUS *CRYPTOCOCCUS FAGI* (BAERENS) DOUGL. IN NOVA SCOTIA.

The opportunity which has been afforded me of reading Mr. R. W. Braucher's article on the occurrence of *Cryptococcus fagi* near Halifax, N.S., enables me to correct the impression it might convey that this insect had not been previously found in North America.

In August, 1911, specimens of the Felted Beech Coccus *C. fagi* Baerens were sent to me by Mr. Justice Meagher, of Bedford, N.S., which is near Halifax, and as a result of a careful inquiry, which was immediately made, we found that this Coccid was present on both ornamental and forest beeches in the neighbourhood of Halifax, where it had apparently existed for a number of years. Mr. R. Power, Superintendent of the Public Gardens, Halifax, sent specimens of *C. fagi*, taken from the European Beech (*Fagus sylvatica* L.) in the Halifax Public Gardens in September, 1911, and he informed me that he had known it for the last twenty years, and that he kept it in check on the purple variety, but did not spray the common variety.

While it is possible that the Coccid may have been introduced into Canada a number of years ago on ornamental beeches from England, to which opinion I am inclined, its occcurrence in Nova Scotia and possibly New England does not necessarily imply introduction. We may be a little too apt on the discovery in the New

World of an insect described from the Old World, especially when it happens to be restricted in its distribution, to ascribe its presence to artificial introduction, when a more complete study of its geographical distribution might conceivably indicate that it was indigenous. Our native insect fauna is far from well known.

Be that as it may, *Cryptococcus fagi* appears to be well distributed in the Halifax district and its serious effects on its host plant, which it usually kills in England and Europe, where I have had the opportunity in the past of studying its occurrence, renders it desirable that care should be exercised to prevent its spread and efforts made to eradicate it on ornamental trees. Theobald (Reports on Economic Zoology, S. E. Agric. Coll. Wye, England, 1905–1912) gives abundant testimony as to the destructive nature of this insect. As a result of considerable experience he has found the Woburn Wash of Mr. Spencer Pickering the most successful remedial measure. This is made as follows: Soft soap, ½ lb.; paraffin oil (kerosene), 5 pints; caustic soda, 2½ lbs.; water, 9½ gallons. The soap is dissolved in hot water, churn in the oil and when well mixed shake in the soda and churn thoroughly, and bring the quantity up to ten gallons with water. This wash is applied during the winter and two or three applications should be made. An effective summer wash is made from soft soap and paraffin (kerosene). Boil 8 lbs. of soft soap and five gallons of paraffin (kerosene) together, and, while they are boiling, add one pint of cold water and stir the mixture well. On cooling it becomes a jelly, which may be stored in pails or boxes. To use, add 10 lbs. of the jelly to every 30 gallons of water. It has been found that on ornamental trees the best results have been obtained by scraping off the felted masses of Coccids and scrubbing with the paraffin wash.

Owing to our Regulations under the Destructive Insect and Pest Act, it is unlikely that this pest will be introduced on beech trees imported into Canada from Great Britain and other parts of Europe, as all such trees are carefully inspected. Further, I am pleased to say that Prof. Brittain, Provincial Entomologist of Nova Scotia, of the Agricultural College, Truro, N.S., is making a careful investigation of the Halifax outbreak.

19th November, 1913. C. Gordon Hewitt,
Dominion Entomologist, Ottawa

NOTES ON NORTH AMERICAN SPECIES OF NEPTICULA WITH DESCRIPTIONS OF NEW SPECIES (LEPIDOPTERA).

BY ANNETTE F. BRAUN, CINCINNATI, O.

Nepticula cratægifoliella Clemens.

Nepticula cratægifoliella Clemens, Proc. Ent. Soc. Phil., I, 83, 1861; Tin. No. Am., 173, 1872; Dyar, List. N. A. Lep., No. 6194, 1902.

Mines of this species, which Clemens named from mine and larva on *Cratægus parvifolia* Ait., occur at Cincinnati on *Cratægus punctata* Jacq. The mines on this species of *Cratægus* sometimes average about 2 mm. in width during the later portion of the mine, but are more often a little narrower, and the frass line is often rather broad. In other respects they agree well with Clemens' description of the mine. The larva, as Clemens notes, is bright green. The cocoon is reddish brown, broader at the anterior end, not much depressed, The imago may be described as follows:

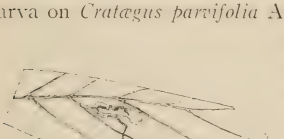


Fig. 1.—Mine of *N. cratægifoliella*

Palpi pale ocherous. Tuft ocherous, faintly tinged with red. Antennæ ocherous, partly suffused with fuscous, eye-caps ocherous.

Thorax and fore wings ocherous, the extreme edge of the costa near the base purplish fuscous, and a broad purplish fuscous band at the apex of the wing. Beyond this band the cilia are pale ocherous, giving the appearance of an ocherous apex preceded by a dark band. Cilia opposite the ends of the band concolorous with it. Hind wings and cilia pale grey.

Legs ocherous. Abdomen purplish fuscous above, ocherous beneath.

Expanse: 3.5 mm.

One specimen bred from a mine collected July 8th; the imago appeared July 29th. The mines occur again more abundantly during the last few days of August and the early part of September.

I refer to this species a flown specimen collected by Mr. Fred Marloff, Oak Station, Pa., June 5th, 1910. In this specimen the

eye-caps are yellowish white and the wings expand 4.5 mm. In all other respects it agrees with the bred specimen.

A distinct and very easily recognized species.

Nepticula latifasciella Chambers.

Nepticula latifasciella Chambers, Bull. Geol. Surv. Terr., IV, 106, 1878; Dyar, List N. A. Lep., No. 6200, 1902.

In the description of this species, Chambers notes that it was taken resting on the trunks of chestnut trees, the leaves of which were full of empty *Nepticula* mines.

I have bred a number of specimens on red and scarlet oaks. The mine is a narrow linear tract gradually broadening to its end, where it measures scarcely 1.5 mm. in width. At first the frass is deposited in a broad line through the centre, later scattered across almost the entire breadth and toward the end of the mine collected in a broad band. On red oak, the mine measures approximately 5 cm. in length; on scarlet oak, it is much shorter, often not exceeding 3 cm. The larva is bright green and escapes from the mine through the lower surface of the leaf. Cocoon rough, ovoid and whitish in color. There are at least two (probably four) generations a year. The mines are abundant toward the end of July and at the beginning of September.

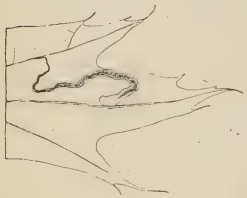


Fig. 2.—Mine of *N. latifasciella*.

Nepticula trinotata n. sp.

Palpi very pale ocherous. Tuft ocherous. Antennæ fuscous, eye-caps whitish. Thorax with deep blue reflections.

Fore wings velvety black, with deep blue reflections in the basal third and somewhat irrorated in the apical third, the scales here having pale bluish iridescent bases. At the basal third on the costa is a white spot of variable size, faintly tinted with violet in some lights. At the apical third there is a costal and an opposite dorsal spot, each larger and of a purer lustrous white colour than the spot at the basal third. The costal spot is usually more oblique,

its tip extending outwardly beyond the opposite dorsal spot. Cilia almost entirely pure white. Hind wings and cilia pale silvery gray.

Legs pale grayish ocherous, tarsal joints dark tipped. Abdomen purplish fuscous above, paler and iridescent beneath in the female.

Expanse: 4.5-5 mm.

Ten specimens bred at Cincinnati, O., from blotch mines on *Hicoria minima* (Marsh.) Britton. The mine is at first an extremely narrow linear tract, later suddenly expanding into a broader tract, 1 mm. or more in width, which in turn becomes a blotch, varying in width from 3 to 6 mm. The mine is almost transparent even in the early linear portion, which thus distinguishes it from that of *N. juglandifoliella* Clemens, on hickory. This is the large blotch mine to which Chambers refers (Psyche, III, 66, 1880). The larva is of a dull grayish colour Cocoon reddish brown.

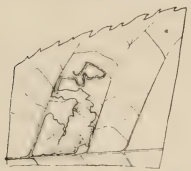


Fig. 3.—Mine of *N. trinotata*.

There are two generations a year, the mines of the first appearing during the early part of July and producing imagoes during the first week of August. The mines of the second generation may be collected at the beginning of September. Up to this time I have found the mines only on the single species of hickory noted above, and never on *Carya alba*, as Chambers says.

Types in my collection.

Nepticula flavipedella n. sp.

Palpi whitish. Tuft usually dark brown, collar creamy white; in one specimen the tuft is reddish ocherous on the face, brown on the vertex. Antennæ fuscous, eye-caps creamy white. Thorax dark purplish brown.

Fore wings dark purplish brown, somewhat shining, cilia with silvery tips. Hind wings and cilia gray.

Fore legs, except the femora, dark brown; middle legs pale silvery, tarsi yellow; hind legs silvery, tibiæ dark brown, tarsi

yellow. Abdomen dark purplish above, paler beneath in the female.

Expanse: 3.5-4 mm.

Three specimens, Cincinnati, O., two bred from mines on swamp white oak (*Quercus platanoides* (Lam.) Sudw.) the other on pin oak (*Q. palustris* Du Roi.) The mine is a very characteristic linear tract. The egg is placed on the upper side of the leaf and the larva for the first few millimeters mines near the upper surface, making a very narrow indistinct mine. Then the mine abruptly enlarges slightly and for a length of 8 or 9 mm. the leaf substance is entirely consumed and the mine rendered transparent. Then follows another enlargement, and the mine, often much contorted, increases very gradually in breadth to the end, where it measures 2 mm. across. This latter portion of the mine is not transparent. The frass is sprinkled in separate grains across the entire breadth of the mine. The accompanying figure shows the appearance of the mine when held toward the light. While most commonly found on pin and swamp white oak, the mine occasionally occurs on red and scarlet oaks. There are three generations a year: mines can be collected during early June, the latter half of July, and the early part of September. The larva is usually green, occasionally purplish and escapes from the mine through the lower surface of the leaf. The cocoon is almost white, woven of coarse rough silk.

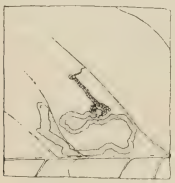


Fig. 4.—Mine of *N. flavipedella*.

The moths are almost indistinguishable from specimens of *N. castaneæfoliella* Chambers; the only constant difference I have found to separate them is the yellow colour of the middle and hind tarsi of *N. flavipede'la* in contrast with the sordid white tarsi of *N. castaneæfoliella*.

Types in my collection.

Nepticula chalybeia n. sp.

Palpi grayish ocherous. Tuft ocherous, collar yellowish white. Antennæ fuscous, eye-caps yellowish white. Thorax steel-gray.

Fore wings very narrow, steel-gray, with faint greenish golden reflections, the apex very slightly tinged with purple. Cilia gray, purple tinged around the apex. Hind wings gray.

Legs gray, tarsi ocherous. Abdomen dark gray, with a purplish luster.

Expanse: 3.5 mm.

Two specimens bred from mines on wild pear, *Pyrus communis* L., at Cincinnati, O. The mine is a short linear tract, brownish green in colour, not exceeding 2 cm. in length and gradually increasing in breadth to the end, where it measures 1.5 to 2 mm. across. The cocoon is small, obovoid and greenish brown. There are three generations a year, and mines may be collected in the early part of June, in July and during the last part of August.

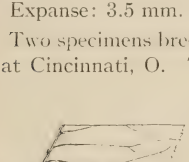


Fig. 5.—Mine of *N. chalybeia*.

Its general pale colour, narrow wings and mall size easily distinguish this species from *N. pomivorella* Pack. which mines leaves of apple.

Types in my collection.

Nepticula apicialbella Chambers

Nepticula apicialbella Chambers, Can. Ent., V. 127, 1873, Cin. Quart. Jn. Sci., II, 118, 1875; Dyar, List N. A. Lep., No. 6185 1902.

Syn. *leucostigma* Braun, Jn. Cin. Soc. Nat. Hist., XXI, 88, 1912.

A larger series, among them a flown specimen in which the white scales at the extreme apex are lacking, and merely the apical cilia are white, establishes the synonymy above given *Apicialbella* was described from flown specimens. This is the only species I have seen with the oblique fascia.

Nepticula altella n. sp.

Palpi silvery gray. Tuft rust red, a little yellowish behind Antennæ fuscous, eye-caps yellowish white. Thorax dark purplish brown.

Fore wings before the fascia purple brown, beyond it deep golden brown with purple reflections; the general colour to the naked eye is deep purple before the fascia and brown beyond it. A silvery fascia crosses the wing at three-fifths, and is usually a little broader on the margins of the wings. Cilia gray. Hind wings deep purple, becoming brown toward the tip.

Legs fuscous, tarsi of the middle and hind pair silvery. Abdomen purplish brown.

Expanse: 6.5-7 mm.

Described from three specimens bred on pin oak, *Quercus palustris* Du Roi and nine captured specimens, all from Cincinnati.

The mine is placed on the lower side of the leaf and is very much contorted, winding back and forth, the bends almost contiguous, and the frass is deposited across the entire breadth of the mine. In its early portion, the mine is scarcely visible on the upper side of the leaf, except as a slight discoloration, later it becomes more distinct, because of the partially eaten parenchyma. The mine is extremely long, but measures only 1 to 1.5 mm. in width at its end. The accompanying illustration shows the mine as it appears when held toward the light; its distinctness has been somewhat exaggerated in the drawing in order to show its course. Cocoon dark brown, somewhat flattened, with projecting edges.

Fig 6.—Mine of *N. altella.*

The mines were collected October 13th and produced imagoes the following May; the flown specimens were also taken in May. The species appears to be single brooded.

Types in my collection.

Nepticula opulifoliella n. sp.

Palpi grayish ocherous. Tuft reddish ocherous, collar sometimes pale yellowish. Antennæ fuscous, eye-caps pale shining yellowish. Thorax dark fuscous, with purple and blue reflections.

Fore wings dark fuscous with pronounced purple and blue reflections, shading to bronzy green below the fold. At three-fifths is a broad very shining silvery fascia with faint golden lustre. Cilia gray, extreme tips pearly white. Hind wings and cilia gray.

Legs dark fuscous, except the middle pair, which are silvery. Abdomen purplish fuscous above, paler beneath in the female.

Expanse: 3.5 mm.

Eleven specimens bred from mines on Opulaster (*Opulaster opulifolius* (L.) Kuntze) at Cincinnati. The mine is a narrow linear brown tract with a dark line of frass running through it. The cocoon is reddish brown, its anterior end broader and flattened. On July 13th the larvæ were nearly full-fed, and all pupated within a few days. The imagoes appeared July 29th to August 4th.

Fig. 7.—Mine of *N. opulifoliella*.

This species resembles *N. roscæfoliella* Clemens, but differs from it in the smaller size, the narrower more lustrous fore wings and the much broader fascia.

Types in my collection.

Nepticula terminella n. sp.

Palpi dull, pale ocherous gray. Tuft on the face dull brownish, on the vertex and head black. Antennæ gray, eye-caps shining white, with a very faint yellow tinge. Thorax bronzy.

Costal half of the fore wing to the fascia, blue-purple, the blue predominating at the extreme edge; below the costa the wing shades into a deep brilliant golden color, becoming more bronzy as it nears the fascia. The fascia is situated just beyond the middle of the wing, is almost straight and has a brilliant silvery lustre. Apical third of the wing blue purple, blue predominating. Just below the apex a double row of silvery scales margins the termen, becoming a single row toward the dorsum and sometimes connected with the fascia. Cilia gray. Hind wings and cilia gray, with a purple tinge.

Legs dark gray, tibiæ and tarsi of the fore pair and tarsi of the others, ocherous. Abdomen dark purplish gray above, yellowish beneath toward the tip, anal tuft yellow.

Expanse: 5-5.5 mm.

Twenty-two specimens bred from mines on red oak (*Quercus rubra* L.) Cincinnati, O.; one captured specimen, taken at Oak Station, Pa., May 17th, 1910, by Mr. Fred Marloff.

The mine is a pale greenish gradually broadening linear tract, 3.5 mm. wide at the end, with a blackish line of frass through the centre. Larva yellow even when very young; thus this mine can early be distinguished from the other linear mines on oak. Cocoon brownish ocherous, obovoid.

Fig. 8.—Mine of *N. terminella.*

There are three generations a year, and, in favourable seasons, a fourth. Mines containing full-grown larvæ may be collected in the middle of June, the latter part of July, the end of August and beginning of September, and during the latter part of October up to as late as the ninth of November, producing imagoes during the summer within two weeks after pupation. The mines occur most commonly on red oak, but also on pinoak (*Q. palustris* Du Roi) on black oak (*Q. velutina* Lam.) and on *Q. marylandica* Muench.

A cotype in Mr. Marloff's collection.

NEW AMERICAN CHRYSOPIDÆ.

BY NATHAN BANKS, EAST FALLS CHURCH, VA.

The following five new species of Chrysopidæ are among recent additions to my collection from Central and South America Of particular interest is the *Nothochrysa*, which is quite different from the other species of the genus from South America and more allied to our Californian one.

Chrysopa rufolinea, n. sp.

Yellowish green, a sinuate band of reddish below antennæ, and one across base of the clypeus, a red spot on the cheek, a red line

from base of antennæ up on to the vertex following a groove near the eye; antennæ pale, unmarked; pronotum with a faint dark mark on each side; thorax, legs and the abdomen unmarked. Wings with pale venation, costals partly obscured, gradates hardly infuscate, stigma greenish. Pronotum very broad, nearly twice as broad behind as long, narrowed in front. Wings long and slender, acute at tips, divisory veinlet ends much beyond the cross-vein, gradates very close together, the inner series very much nearer outer than to the radial sector, five or six in inner row, eight or nine in outer; marginal forks two and a half times as long as broad; second cubital cell much narrower at tip than the third at base. In hind wings five inner and eight outer gradates. Expanse 30 mm.

From Cali, Colombia, 1000 m (Fassl).

Chrysopa sarta, n. sp.

Yellowish green; no marks on head nor palpi; basal joint of antennæ yellowish, with black outer streak, rest of antennæ (including second joint) black, but getting paler towards tip, pronotum pale, with red marginal stripe; rest of thorax, legs, and the abdomen pale, unmarked. Wings hyaline, unmarked, venation greenish, most cross-veins wholly black, but some costals near stigma are pale, gradates black, and some veins running into hind margin also black; origin of the radial sector black; stigma scarcely distinct; hind wings with veins all pale greenish. Pronotum about as long as broad, not much narrowed in front. Wings moderately slender, acute at tips, fore wings with divisory veinlet ending beyond the cross-vein, second cubital cell much narrower than the third; five inner, seven outer gradates, each much separated from the next, inner series as close to radial sector as to outer series; marginal forks about three times as long as broad; hind wings with four inner and six outer gradates. Expanse 26 mm.

From Orosi, Costa Rica, 500 m. (Garlepp).

Chrysopa leptana, n. sp.

Head reddish yellow; maxillary palpi with last two joints black; basal joint of antennæ yellowish, rest (including the second joint) black; pronotum green, rest of thorax green, with pale spots above base of wings; legs and abdomen greenish, unmarked. Wings hyaline; venation green, cross-veins, gradates, many branches

ending in hind margin, divisory veinlet, base of radial sector, upper side of second cubital cell partly, and bases of branches of radial sector black. Hind wings with costals and some other cross-veins partly black; stigma in both wings long, deep green. Pronotum much broader than long, narrowed in front. Wings not very broad, acute at tips, two or three inner gradates, four or five outer ones, inner series much nearer to outer than to radial sector; marginal forks hardly twice as long as broad; divisory veinlet ends beyond the cross-vein; second cubital cell much narrower than the third. Expanse 24 mm.

From Oaxaca, Mexico (Crawford).

Leucochrysa luctuosa, n. sp.

Face with large spot on clypeus and triangular spot under each antenna reddish, vertex with an irregular red stripe each side; palpi unmarked; basal joint of antennæ with broad red stripe on outer side, about 20 of next joints with black on inner side; pronotum with red stripe on each side (not marginal) more approximate behind the furrow; thorax with red spots each side in front, two on each scutellum, and mark over base of hind wings; basal abdominal segments with red mark each side. Wings with greenish venation, base of radial sector and a portion toward stigma with its branches each side partly black; many costals at margin black, two or three radial cross-veins near base are black in middle; the base of second cubital cell, and part of third, and a few anals near by are black, gradates pale; hind wings with radial sector black near stigma, not at base, outer hind margin blackish for a long distance; stigma in both pairs black at base. In fore wings the inner gradates extend basally, so there are about 15 or 16 of them, 12 in the outer series, the two series farther apart in middle than at either end; radial sector sinuous.

Expanse 5.7 mm.

From Orosi, Costa Rica and Rio Longo, Bolivia (Fassl). Related to *L. azevedoi* Navas (which I have from British Guiana) but much larger, and various minor marks different.

Nothochrysa tibialis, n. sp.

Head yellow, a black streak under eyes, two large black or dark brown longitudinal marks on the vertex; palpi marked with dark; basal joint of antennæ wholly shining dark brown above

rest of antennæ beyond blackish, but paler towards tips; pronotum with a broad lateral black stripe, almost connected across the furrow; thorax with a broad black stripe over base of wings, anterior edge of mesothorax black; abdomen with a blackish stripe each side above, nearly connected at the tips of the segments; pleura with two black spots; legs pale, tibiæ I and II with a dark mark on outer base. Wings with almost wholly dark brown venation, the subcosta pale, and parts of median, the cubitus and anals at base also pale; hind wings with mostly pale venation, the costals, veins ending in hind margin, and base of radial cross-veins black; stigma narrow, yellow-brown, not distinct. Pronotum a little longer than broad, slightly narrowed in front; wings moderately broad, rounded at tips, the divisory veinlet ends in end-vein of cell, but near its upper end, so that the divisory cell is much broader at base than at tip, six gradates in each series, each gradate widely separated from the next, the inner series much nearer to radial sector than to outer row; the outer marginal forks mostly three times as long as broad; costal area quite broad; in hind wings five or six inner gradates and six outer ones. Expanse 27 mm.

From Rio Longo, Bolivia, 750 m. (Fassl).

ON THE SYNONYMY OF CERTAIN FLORIDA LEPIDOPTERA.

BY WM. BARNES, M.D., AND J. McDUNNOUGH, PH.D., DECATUR, ILL.

In the August number of Insecutor Inscitiæ Menstruus, Dr. Dyar has justified the title of his publication and subjected a recent papers of ours on "Some Apparently New Florida Species."* to a grilling calculated to prevent less enthusiastic entomologists than ourselves from ever again obtruding themselves on the notice of the long-suffering entomological public.

It is not the purpose of this article to justify the causes that led to the article in question; this, if necessary, can be left to other competent individuals; we would merely in the following notes give our own views on the points of synonymy as laid down by Dr. Dyar, for we fear that in several instances his desire to swell the list of synonyms has led him to be a little hasty in his judgment.

*Contributions, Vol. II, part 4, 1913.

C. obliquata B. & McD.

Dr. Dyar is correct in making this a synonym of *laguncularia* Dyar. We overlooked the branching of vein 8 close to the apex of the wing in our examination of the single type specimen.

Acidaliodes eoides B. & McD.

This is not *Pseudcraspedia basipunctaria* Wlk. As stated in our article, the venation is that of *Acidaliodes*; i.e., vein 7 is free and veins 8, 9, 10 and 11 of primaries *are stalked*, and not 7, 8, 9, 10 stalked with 11 free as in *Pseudcraspedia*. We have four specimens from Stemper, Fla., which agree in venation with Hampson's definition, and may be either *basipunctaria* Wlk. or *penumbrata* Hlst., neither of which species we know. There is great superficial likeness between our species and the Stemper specimens, and we are not surprised that Dr. Dyar should have failed to recognize the points of difference especially as Mr. Grossbeck, to the best of our knowledge, had captured no specimens of *eoides*.

Aresia parva B. & McD.

Having no knowledge of exotic *Lithosiidæ*, as Dr. Dyar has been kind enough to state, we naturally fell back on Hampson's "Keys" published in the Cat. Lep. Phal. Brit. Mus. and arrived at the conclusion, rightly or wrongly as the case may be, that we were dealing with a Noctuid; finding in Hampson's work, *the latest on the subject*, no genus suitable for the occasion, we were rash enough, in our wild haste for publicity, to create the genus *Aresia*, which Dr. Dyar promptly makes a synonym of *Afrida* Mœsch. We regret that the original generic definition is not before us, but if Hampson be correct, we would point out that, in *Aresia, vein 5 of secondaries is lacking*, a mere fold occurring in its place and 8 is only joined to cell at base of wing; whereas in Hampson's venation figure vein 8 is from middle of cell and 5 is present. Dr. Dyar, in his paper on the genus *Afrida*, calls attention to the fact that in his specimens 8 is only joined to cell at base, but makes no mention of vein 5. He neither gives *any* generic characterization, nor did he have any specimens of the generic type before him. It remains therefore to be proven by examination of specimens of the generic type, *tortriciformis* Mœsch, whether these two genera are synonyms.

Regarding the position, Dr. Dyar himself states in the introduction of his article on *Afrida*: "I think the genus very doubtfully placed in the Lithosiidæ; I should rather think it a noctuid." If an authority like Dr. Dyar, whose knowledge of exotic Lithosiidæ is evidently profound, should be led to such a statement, then surely we may be pardoned for having actually included *Aresia* in the Noctuidæ. We accept Dr. Dyar's reference of *parva* to *ydatodes* Dyar; the specimens mentioned from Brownsville, Texas, in our original description would fall under *minuta* Druce according to Dr. Dyar's paper.

Anomis serrata B. & McD.

We bow before Dr. Dyar's decision and make *serrata* a synonym of *xanthindyma* Bdv. We had based our supposition that we were dealing with a new species on Dr. Dyar's recent paper on Cotton Moths in the January number of his publication, in which, under *Cosmophila erosa*, no mention is made of the two forms of the ♂ antennæ; we had, unfortunately, no means of consulting the publications on exotic species. We are glad that Dr Dyar's opinion at least coincides with our own as to the specific distinctness of the two forms.

Psychidae

Dr. Dyar's remarks under this head, and his reference of our species *nigrita* and *pygmæa* as "grass" and "tree-trunk" forms of *Platoeceticus gloveri* Pack., we are not at all prepared to accept. In Europe, where the *Psychidæ* have for years been the subject of special study, the larval cases are recognized as one of the best means of specific identification. We would commend to Dr. Dyar's perusal the introduction to the Psychidæ by Dr. Rebel in Spuler's "Schmetterlinge Europas," where, among other things, it is stated "Der Sack ist sehr verschieden gestaltet, immer aber für die Art charakteristisch gebaut and bekleidet, so dass sie sich schon an dem Sack meist erkennen laesst." The sacks of our two species are as different from each other as they well could be; the one (*nigrita*) is broader towards the opening and heavily thatched with minute particles of lichen; neither bears much resemblance to Packard's figure of the sack of *gloveri*, which we also found on orange trees in Florida, but which failed to produce the imago;

these sacks differed in various ways from those found on grass. Regarding the venation, it is a well-known fact that in this family the venation is variable and individuals with extra veins frequently occur, usually one of the median or radial branches being involved; but we query greatly whether the venation be of "no value"; our studies of Psychid venation have been very limited, but when such a worker as Hampson divides this family into three subfamilies (Moths Brit. Ind. Vol. I). *Oeceticinæ*, *Psychinæ*, and *Chaliinæ* on the basis of vein 1b of primaries sending several, one, or no branches to the internal margin, we are apt to regard such work as authoritative; it at least forms a better basis for classification than such a system as Dr. Dyar would apparently have us adopt where all species with black wings are lumped together, regardless of size, larval sack or venation. Hampson's system, as stated in our paper, would throw *Manatha nigrita* into the *Psychinæ* and *Prochalia pygmæa* into the *Chaliinæ*. With regard to *Platoeceticus* Packard (Ent. Amer. III, 52) distinctly states that the venation of the secondaries is as in *confederata* Grt.; i.e., with vein 6 absent; an examination of a long series of *nigrita* from both Florida and Brownsville, Texas, has failed to show a single specimen in which all the veins on the secondaries were not present; the presence of eight veins can surely then be accepted as the normal condition. This, combined with a marked difference in sack and food plant, would point to a specific distinctness. Dr. Dyar has frequently (*Megalopygidæ*, *Phycitinæ*) erected new genera based on much weaker characters than the above. His remark, that he has examined five specimens of *carbonaria* and found no two alike in venation, proves nothing unless these five specimens have been bred from similar sacks collected on similar food-plants. If this be not so, then it would only show that the Psychidæ of the National Museum are in need of a careful revision. Further, Dr. Dyar is very careful not to state in just what particulars these five specimens differ from one another. We do not know whether the specimens referred to by Dr. Dyar, as collected by Dr. F. M. Jones at Biloxi, Miss., are those described as *Eurycttarus tracyi* (Ent. News 22, 194). In any case, our *nigrita* could not be confounded with this insect, which is much heavier and stouter, besides differing in venation.

Stenoptycha solanis B. & McD.

We reserve our decision as to whether this species is synonymous with *pterophoralis* Wlk. or not, until we have had a chance to compare specimens with Walker's type. Certainly nothing definite can be ascertained from the original description.

Storteria unicolor B. & Mc.D.

Our type, a very fresh specimen, certainly shows long hairs on the median vein of secondaries, and this fact led us to place the genus in the Crambinæ. We agree, however, with Dr. Dyar, that the species shows great affinity to *albinella* Cram. and are quite ready to sink the generic term as a synonym of *Rupela* Wlk.

Davisia singularis B. & McD.

We learn from Prof. T. D. Cockerell that the genus *Davisia* is preoccupied by Preston, 1910, for a genus of Mollusks. We, therefore, propose the name *Neodavisia* in its place.

Jocara perseella B. & McD.

Dr. Dyar lists this as a synonym of *incrustalis* Hlst. We might note that Hulst's species was described from a single ♀ from Colorado, a locality where we imagine the Alligator pear (*Persea*) would scarcely occur. The description of the larva of *incrustalis* Hlst. given by Dyar in Proc. U. S. Nat. Mus., 1900, p. 284, gives *Nectandra* and *Persea* as food-plants. This larva is presumably referable to our species, but a careful comparison with Hulst's type will be necessary before one can definitely assume the two names to be synonymous, even in spite of the fact that one of Dyar's bred specimens was identified by Hulst; this gentleman's determinations were often erroneous. It is, of course, possible that the locality label was incorrect.

Tetralopha querciella B. & McD.

The fact that this species is labelled *subcanalis* Wlk. in the Nat. Mus. Collection is not final, as without a direct comparison with the type Walker's species are impossible to identify. Dr. Dyar might at least have given us the benefit of the doubt.

Homoeosoma differtella B. & McD.

We can express no opinion as to whether this species is synonymous with *electella* Hlst. from Texas without a careful examination of the types.

A NEW FOSSIL SAWFLY FROM FLORISSANT, COLORADO.

BY T. D. A. COCKERELL, UNIVERSITY OF COLORADO.

During the latter part of August, of the present year, Dr. J. H. Todd and his son, Dr. J. C. Todd made a small collection of fossils in the Miocene shales at Florissant. On looking over the material, I found one new species, which they kindly presented to the Museum of the University of Colorado.

Tenthredella toddi, n. sp.

Length about 8 mm. or a little more (apex of abdomen missing); anterior wing 7 mm.; head and thorax black; abdomen pale (probably green in life), with a dorsal black band which is broad basally, sending a branch on each side to or nearly to the anterior lateral corners of the abdomen, posteriorly rapidly tapering, soon becoming a mere narrow stripe; wings clear, nervures dark; venation as in MacGillivray's figure of *Tenthredella flava* (*Tenthredo flava* Poda) in almost every respect, except that the anal or lanceolate cell of hind wings is petiolate apically (petiole 96 microns long), and the lanceolate cell of anterior wings is joined by the transverse median nervure considerably beyond the middle of the distance from the cross-nervure to the apex. The marginal cell is also decidedly deeper. The following measurements are in microns: *Anterior wing*, depth of stigma, 400; end of stigma to end of marginal cell, 1950; second submarginal cell on marginal, 1025; third submarginal on first marginal, 530; third submarginal on second marginal (beyond cross-nervure of marginal), 400; basal nervure, 530; first discoidal on second, 800, and on third, 640. *Posterior wing*: Depth or width of lanceolate cell in middle, 480.

Among the species described from the Florissant shales, this can only be associated with *Tenthredella submersa* (*Tenthredo submersa* Ckll.), which is about 13 mm. long, and differently coloured. In the present fauna of Colorado, species of this genus differ in the shape of the third submarginal cell; thus *Tenthredella flavomarginis* (*Allantus flavomarginis* Norton) has this cell short, the upper side no longer than the outer; whereas *Tenthredella ferrugineipes* (*Tenthredo ferrugineipes* Cresson) has this cell much longer. In *T. foddi*, the cell is of the longer type.

NOTES ON THE POSITIVE HYDROTROPISM OF GERRIS MARGINATUS SAY AND DINEUTES ASSIMILIS AUBE.

BY HARRY B. WEISS, NEW BRUNSWICK, N.J.

Wingless forms of *Gerris marginatus*, which is quite common throughout New Jersey, when removed from a pond containing some three thousand square feet of water and liberated at distances of one, two, three, four, five, six, seven, eight, and nine yards from the water, immediately made their way back to the water without hesitancy. Of course their movements, which consisted of a series of jumps, were more or less clumsy, but all started in the right direction even though purposely headed the wrong way.

When liberated at a distance of ten yards, they had some slight trouble in getting their bearings, but after making several false starts, finally wound up by going in the direction of the water. At a distance of fifteen yards, a longer time and more moving around were required before the right direction was located. At thirty and forty yards away, they seemed to lose their bearings completely and moved aimlessly about in all directions. Even at the end of an hour they were no nearer the water.

The actions of *Dineutes assimilis*, which is also quite common in New Jersey, were somewhat more interesting. These beetles, when liberated three or four feet from the water, scrambled back with difficulty owing to the character of their legs, which were not meant for locomotion on land.

At nine or ten feet from the water, after trying rather akwardly to walk back, they rose to a height of ten or twelve feet and flew towards the pond, both with and against a slight breeze. At 75 feet from the water, they walked in all directions and then rose in irregular circles to a height of 30 feet and flew to the pond.

On several occasions, when a brisk wind was blowing from the direction of the water, they were carried inland in spite of heroic attempts to fly against it. When liberated at a quarter of a mile from the water, after an aimless existence on the ground for half a

hour, they rose in irregular widening spirals to a height of fifty feet and flew off in the direction of the water. It is not known whether these specimens ever reached the pond, inasmuch as trees obstructed the view. Nevertheless they started in the correct direction even against a slight breeze.

BOOK NOTICES.

The Natural History of the Toronto Region, Ontario, Canada; published by the Canadian Institute, Toronto, 1913; 419 pp., with several illustrations and maps.

This work which has been prepared for the members of the Twelfth Geological Congress, which recently met in Canada, and for all who may have an interest in the history and natural history of the Toronto district, is a most interesting and valuable contribution. The twenty-two chapters (there are twenty-three, but the last describes briefly localities for excursions) have all been written by specialists. The titles of the chapters will give a splendid idea of the scope of the work. These are: I, Toronto, an Historical and Descriptive Sketch; II, The Indians who formerly Inhabited or Visited the Site of Toronto; III, Geology of the Toronto Region; IV, The Climate of Toronto; V, Life zones; VI, The Seed Plants of Toronto and Vicinity; VII, Ferns and Fern Allies; VIII, Mosses and Liverworts; IX, Mushrooms and other Fungi; X, The Algæ; XI, Lichens; XII, Mycetozoa, or Slime Moulds; XIII, Insect Galls of the Vicinity of Toronto; XIV, Zoology; XV, Mammals; XVI, Birds; XVII, Reptiles; XVIII, Amphibia; XIX, Fishes; XX, Invertebrates other than Insects and Mollusks; XXI, Mollusca; XXII, Insects and their Allies.

In Chapter XIII Dr. Cosens discusses briefly the various types of galls and follows with lists of gall insects in the various orders. Useful notes are given with each species. Under Hemiptera nine species, are listed, under Lepidoptera four species, under Diptera 12 species under Coleoptera two species, under Hymenoptera 39 species. Dr. E. M. Walker is responsible for Chapter XXII, the largest in the book, comprising pp. 295-403. This chapter, as already mentioned, is devoted to Insects and their Allies. Although the lists presented are by no means complete, as is stated, they are, how-

ever, of extreme value and will, it is hoped, lead to greater zeal in collecting so that many additions may be made. Unfortunately, entomologists are few in Toronto, and comparatively little systematic collecting has been accomplished outside of two or three of the better known orders, and even in these the work has been confined largely to certain families. It is, however, such lists as these which furnish the foundation upon which to build. Altogether 2,448 species are listed, as follows:

Orthoptera	61
Dermatoptera	1
Plecoptera	2
Ephemerida	12
Odonata	60
Hemiptera	92
Neuroptera	8
Trichoptera	5
Coleoptera	1076
Lepidoptera	619
Hymenoptera	263
Diptera	249
	2448

At the end of the lists references are given to the more general descriptive works, useful in identification.

ARTHUR GIBSON.

"ENTOMOLOGY WITH REFERENCE TO ITS BIOLOGICAL AND ECONOMIC ASPECTS."

REVIEW OF DR. FOLSOM'S REVISED ENTOMOLOGY.

Dr. Folsom's Entomology is familiar to all students of the subject, holding as it does a place of its own in the field of Entomology. The revised edition, while no larger than the previous editions, presents many new and interesting facts. The Chapter on Evolution has been omitted and one on Transmission of Disease by Insects substituted.

Most text books of Entomology consider it as a subject in itself ignoring its relation to, and dependence upon, the wider

science of Biology. Dr. Folsom, in meeting this want, by presenting the subject primarily from a general biological standpoint, has created an interest for the average student which most text books fail to do.

I have long felt that the weakest point in our present system of teaching Entomology has been in the undue importance placed upon the memorization of multitudinous details. For the specialist in Entomology the latter system is a necessity, but for the average student, whose time is limited, the general principles of Entomology, as outlined in Dr. Folsom's book, will give the best basis for private study. Moreover, he will acquire an interest in this subject and in the wider one of which Dr. Folsom shows it to be a part. For instance, in his chapter on colour and coloration he has considered his subject from a general standpoint, dealing first with the sources of colour and then with the conditions which may cause variations in the formation of colour in insects; so that with a knowledge of the general principles, as designated by Dr. Folsom, the student is encouraged to develop reason in lieu of memory.

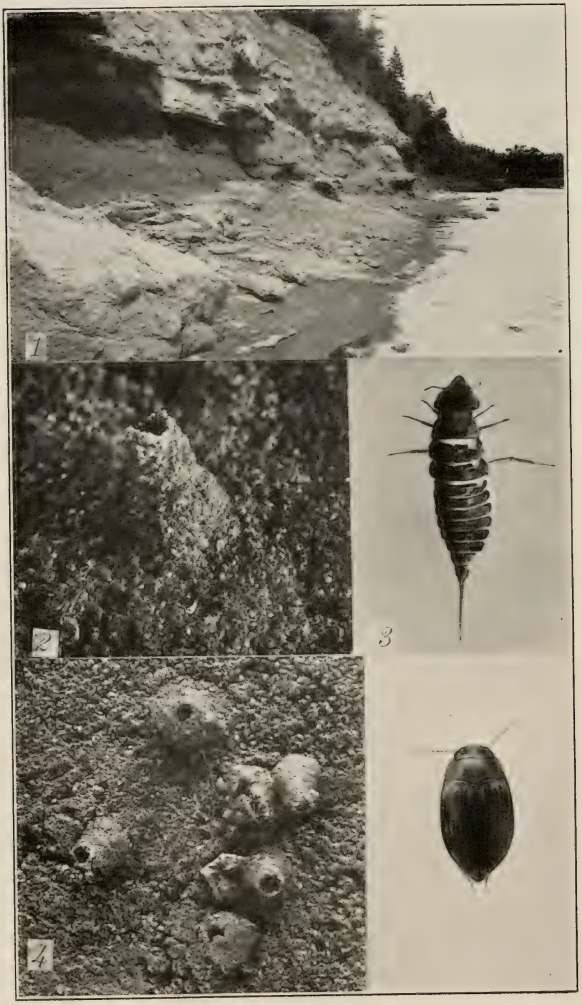
The new chapter on Transmission of Disease by Insects is a valuable addition. This phase of Entomology is one which is receiving a great deal of attention at the present time, and Dr. Folsom has presented the results of modern research in a concise and interesting manner.

The illustrations throughout are particularly fine and appropriate to the text.

The former comprehensive bibliography has been augmented by the titles of one hundred new works and will be found very useful to the student of Entomology.

Tennyson D. Jarvis.

Mailed January 14th, 1914.



HYDROPORUS SEPTENTRIONALIS, GYLL.

The Canadian Entomologist.

VOL. XLVI. LONDON, FEBRUARY, 1914 No. 2

LIFE-HISTORY OF A DYTISCID BEETLE (*HYDROPORUS SEPTENTRIONALIS* GYLL.).*

BY ROBERT MATHESON, ITHACA, N. Y.

The Salmon River, a small stream which flows close by the Nova Scotia Agricultural College, Truro, N. S., harbours many interesting species of aquatic insects. At this point it flows through a red sandstone region, the high, red rocky walls standing out in clear relief against a green background of grassy turf and coniferous trees (pl.1, fig.1). During midsummer the river becomes a small stream trickling lazily over its pebbled bottom,leaving wide stretches of flat red rocks covered with fine sand. Here abound mayflies, stoneflies and numerous small water beetles, besides many others. Along the sandy banks tiger-beetles are abundant, and numerous heads are seen to appear and disappear as one walks slowly along. I was interested in trying to rear some of the more common Dytiscid beetles, but found it a difficult task after procuring the larvæ to provide the proper conditions in order to secure continued larval development, pupation, and finally the coveted adult.

While collecting one day last summer (August 7, 1913), I was delighted to find on turning over some flat rocks several beautiful white pupæ quietly resting on their backs in rather wonderfully constructed pupal chambers. Furthermore, there were several different, not only species, but families represented, not all, however, in such peculiar pupal chambers. I was not long in finding representatives of the Carabidæ, Dytiscidæ, Hydrophilidæ and Parnidæ, oftentimes all under the same large flat stone. Unfortunately, other pressing work did not give me opportunity to make as full notes on as many of the species as I could wish. However, there is one interesting form, the life-history of which, in part at least, I wish to present in this short paper.

*This species was kindly determined for me by Mr. John D. Sherman, Jr.

On turning over numerous flat stones I found the pupæ of this species (*Hydroporus septentrionalis* Gyll.) rather abundant in some places. They were found abundant under stones lying on soft, damp, fine sand overlying the broad flat rock-bed now above the water. These were abundant on August 7, 1913, when I discovered this insect, and I at first despaired of finding the larvæ, but on turning over numerous stones I was soon rewarded by finding all stages, larvæ, pupæ and adults. The larvæ construct rather peculiar pupal chambers. These pupal chambers consist of the fine, damp sand, lying over the red sandstone rock which forms the river channel, built into peculiar mounds, usually with a small opening at the top. These mounds are turret-shaped, measuring 6-7 mm. wide at the base, 5-6 mm. high, with an apical diameter of about 2.5 mm. One of these is shown on pl. 1, fig. 2. They are rather beautiful, and when abundant, as they often are under

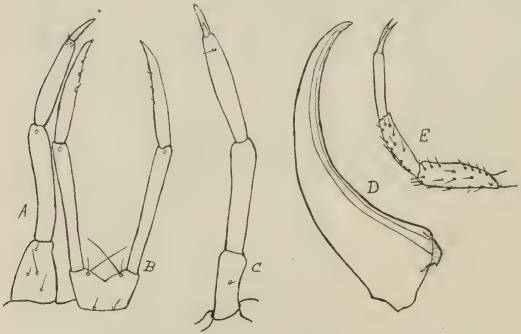


Fig. 9.—*Hydroporus Septentrionalis*, larval structures.

flat rocks, they present, grouped thus together, the appearance of a miniature mud village (pl. 1, fig. 4). I was fortunate enough to observe through the opening in the top one of the larva construct part of its domicile. Round and round it moved within, gradually deepening, and at the same time widening, the interior of the future pupal home. It would turn over and over, smoothing out the sides. I did not observe the beginning of any of these pupal chambers, but I presume the larva began at first to

mine into the soft sand, and by continual turning round and round or moving back and forth gradually construct its chamber.

Although I was fortunate enough to find all the stages of this beetle, I did not learn anything of its ways in the nearby river. They must have been abundant, for the pupal chambers were observed at various places for nearly a mile along the river bank.

Description of larva.

Full-grown larva (pl. 1, fig. 3) ready to pupate, measures 5.3 mm.; caudal setæ 2 mm. additional; head 1.04 mm.

General colour brown above, nearly pure white beneath. Head yellowish brown, a V-shaped brown spot on vertex, the apex directed caudad. Head measures 1.04 mm. long and .9 mm. at its widest part just behind the eyes. Rostrum .16 mm. long, rounded in front, smooth and without setæ on margin. Antennæ yellowish brown, 4-jointed; 1st joint, .12 mm.; 2nd joint, .2 mm.; 3rd, .2 mm.; 4th, .08 mm. A few scattered setæ present on the head, the lateral margins just behind the eyes bearing several larger setæ. Mandibles are long, sickle-shaped, perforated to their upturned tips, which rest against the lower surface of the rostrum, yellowish at base, becoming brownish yellow at their tips. The perforations run along the inner sides of the mandibles (fig. 9, D). The maxillæ (fig. 9, A) are greatly reduced, consisting only of a 4-jointed palpus; 1st joint, .33 mm.; 2nd, .65 mm.; 3rd, .5 mm.; 4th, .2 mm. The labium (fig. 9, B) is small, quadrangular in shape, emarginate in front, with 4 setæ, two long ones arising from the inner surface and two shorter ones on the lower surface, just mesad of the point of origin of palpi. The palpi are two-jointed and arise from the outer angles of the labium, 1st joint, .76 mm.; 2nd, .5 mm. Eyes 6 in number, arranged in two transverse rows.

The prothorax is yellowish brown in colour, with a dark brown spot on each side of the middle line, near the posterior margin. The remaining segments are yellowish brown in colour, with a lateral row of lighter yellow spots on each side of the middle line, extending back to the seventh abdominal segment. These spots

are irregular in shape, larger on some segments than others. The seventh and eighth abdominal segments are light yellowish brown in colour. Each segment bears a fringe of setæ on its posterior margin, while numerous smaller setæ are scattered over their dorsal surfaces. The setæ constituting the fringe are much shorter than the segments. The cerci consist of two long, slender, two-jointed appendages. They are 2 mm. long, much longer than the seventh and eighth abdominal segments taken together. The 1st segment measures 1.2 mm., while the long seta-like terminal joint measures .8 mm. The basal segment is studded with numerous small setæ. Three long, fine setæ arise at the distal end of each basal segment, and are about half as long as the second segment of the cerci.

The legs are almost white in colour. The coxæ are shorter than the femora. The femora and tibia are armed with stout spines on their ventral surfaces. There are but few setæ on the tarsi and swimming fringes are lacking. The tarsal claws are long and sharp.

The pupa

The pupa is pure white in colour, except the eyes, which are black. It rests upon its back in the pupal chamber. Length 3.5 mm. The head lies incurved upon the prosternum, and is rather abundantly provided with strong, short setæ, which prevent the tender pupa from coming in contact with the fine sand grains. The anterior margin of the pronotum is provided with a row of strong setæ, while numerous smaller setæ are present on the dorsal side of all the thoracic segments. The posterior margin of each abdominal segment is considerably elevated and is provided with a row of strong setæ. The abdomen ends in a pair of large ventral spines measuring .5 mm. By the aid of these spines the pupa is enabled to move about in the chamber, and at the same time prevent injuring itself from coming in contact with the small grains of sand. I do not know how long the pupal period lasts, but not more than a week or ten days.

The adult is a rather prettily-marked beetle, and is represented in fig. 5.

NEW OR LITTLE KNOWN SPECIES OF APHIDIDÆ.

BY JOHN J. DAVIS, BUREAU OF ENTOMOLOGY, WASHINGTON, D.C.

Macrosiphum creelii, n. sp.

Wingless viviparous female. (Fig. 10.—Plate II, figs. 1, 2.)

Entire body pea green, excepting the head, which is a whitish green, and a narrow darker green median longitudinal line on dorsum of abdomen. Segments I and II of antenna concolorous with body; segments III, IV and basal half of V brownish, with darker

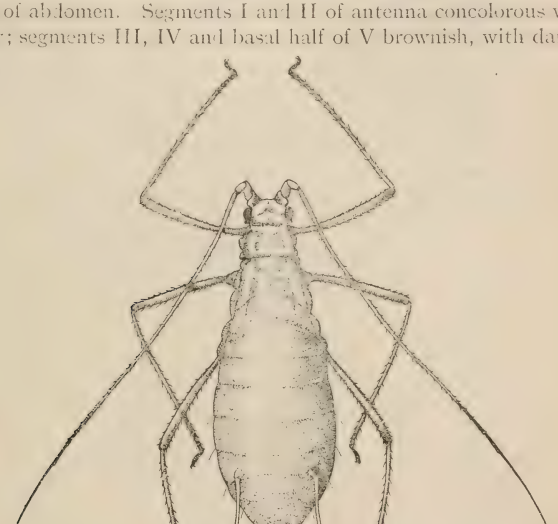


Fig. 10.

tips and the distal half of V and all of VI black; filament of segment VI longest, reaching to or a little beyond tip of body; segment III with 3 to 5 circular sensoria in a row at base, and segments V and base of VI with the usual distal ones. Eyes blood red. Beak barely reaching coxæ of second pair of legs. Legs with femora

pale whitish green with dusky tips, tibiæ pale brownish with black tips, and tarsi black; hind tibiæ very long, being one-half longer than middle tibiæ. Cornicles pale green at basal half, the distal half very pale brownish with blackish tips; reaching a little beyond tip of cauda; narrow and cylindrical, the tip distinctly reticulated. Cauda concolorous with body, ensiform.

Measurements of living and balsam-mounted specimens as follows: Length of body, not including cauda, 2.6—4.0 mm.,* average 3.1 mm. (average of living individuals was 3.3 mm.); length to tip of cauda 3.1—4.5 mm., average, 3.6 mm. (average of living individuals, 3.9 mm.); width 1.04—1.93 mm., average 1.26 mm. (average of living individuals, 1.16 mm.); length of cornicles 1.10—1.31 mm., average 1.23 mm.; length of cauda 0.58—0.71 mm., average 0.64 mm.; length of hind tibia 3.1 mm.; length of middle tibia 2.1 mm. Antennal measurements as follows:

ANTENNAL SEGMENT NO. 1m.

Locality, date, etc	I.	II.	III.	IV.	V.	VI. (base)	VII. (fil't)	Total
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Lovelock, Nevada, May 22, 1911, C. W. Creel	0.232	0.135	1.219	0.948	0.852	0.213	1.393	4.992
La Fayette, Ind. (Utah material) Nov. 22, 1912...	.174	.097	1.219	.987	.832	.213	1.451	4.973
La Fayette, Ind.(1) (Utah material) Nov. 22, 1912...	.193	.097	1.219	.948	.813	.232	1.432	4.934
La Fayette, Ind.* (Utah material) Aug. 23, 1912...	.208	.078	1.130	.904	.817	.208	1.234	4.579
La Fayette, Ind. (Utah material), Aug. 23, 1912...	.191	.087	1.130	.956	.800	.208	1.374	4.746
La Fayette, Ind.(1) (Utah material), Aug. 23, 1912...	.208	.087	1.130	.991	.852	.226	1.460	4.954
La Fayette, Ind.(1) (Utah material), Aug. 23, 1912...	.208	.087	1.113	1.026	.869	.226	1.443	4.972
La Fayette, Ind.(1) (Utah material), Aug. 5, 1912....	.174	.097	.987	.987	.755	.213	1.374	4.587
La Fayette, Ind. (Utah material), Aug. 5, 1912....	.174	.097	1.045	.948	.744	.194	1.355	4.587
La Fayette, Ind. (Utah material), Dec 6, 1911....	.....	.....	1.219	1.064	.929	.251	1.471	....

(1) Measurements from living specimens.

*An unusually large specimen collected by Creel in Nevada.

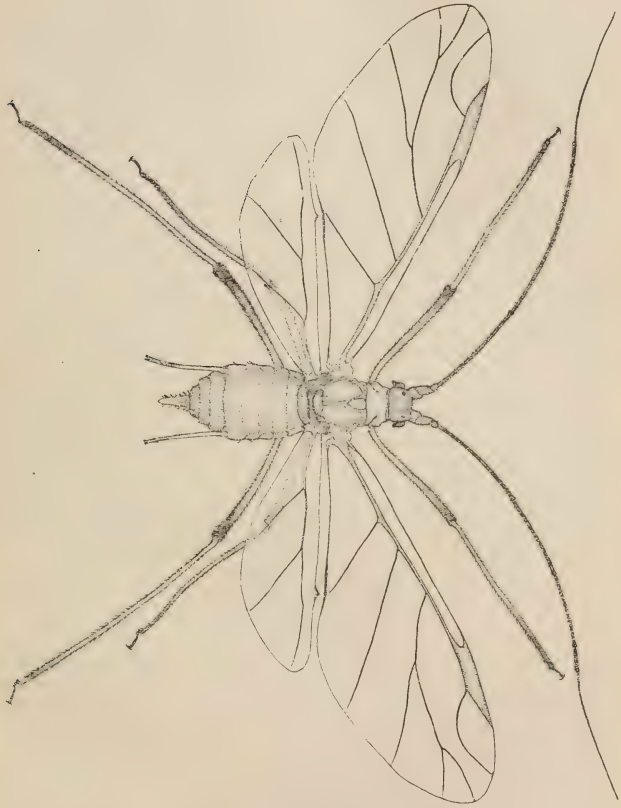


Fig. 11.—*Macrosiphum creelii*, winged viviparous female.

Winged viviparous female. Fig. 11.—Plate II, figs. 3, 4.

Head pale greenish yellow. Antennæ black excepting segments I and II, which are pale dusky; filaments of segment VI longest, reaching beyond tip of body; segment III bearing 14 to 21

circular sensoria in a row and usually on basal two-thirds or three-fourths; segments V and base of VI with the usual distal sensoria. Eyes blood red, ocelli brownish. Beak reaching nearly to coxæ of second pair of legs. Thoracic plate yellow or orange yellow. Wings large, with narrow but prominent dark brownish veins, the venation as shown in illustration. Legs with basal half of femora pale green and the distal half becoming dusky to blackish, tibiæ pale brownish with black tips, and tarsi black; hind tibia rather long, being nearly one-half longer than the middle tibia. Abdomen pale green, with a moderately narrow median longitudinal dorsal line of a darker green extending to length of the abdomen; the reddish eyes of the unhatched young often showing through the body wall. Cornicles pale transparent green at basal half, becoming dusky to blackish at the distal end; reaching beyond tip of cauda; cylindrical and rather narrow; the tip distinctly reticulated. Cauda concolorous with abdomen, ensiform.

Measurements of living individuals and specimens in balsam, as follows: Length of body, not including cauda, 2.36—3.56 mm., average 2.72 mm.; length to tip of cauda 2.71—3.83 mm.; average 3.21 mm.; width of body 0.85 to 1.47 mm., average 1.02 mm.; length of wing, average 4.84 mm.; width, average, 1.66 mm.; cornicle, average, 1.75 mm.; cauda, average, 0.46 mm.

Antennal measurements as follows:

ANTENNAL SEGMENT NO. 1m

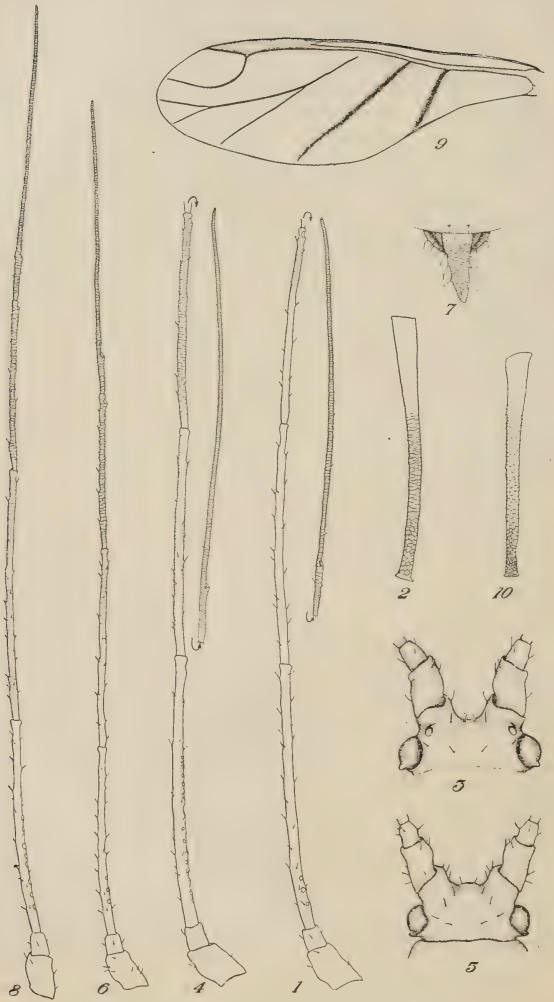
Locality, date, etc	I.	II.	III.	IV.	V.	VI. (base)	VII. (fil't)	Total
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
Lovelock, Nevada, May 22, 1911, C. W. Creel.....	0.174	0.097	1.084	0.871	0.774	0.193	1.161	4.354
Lovelock, Nevada, May 22, 1911, C. W. Creel.....	.174	.116	1.045	.890	.793	.232	.....	..
La Fayette, Ind. (Utah material), Nov. 6, 1912....	.174	.097	1.239	1.122	...	....	....	....
La Fayette, Ind. (Utah material), Nov. 6, 1912....	....	....	1.200	1.103	.832	.213	1.355	....
La Fayette, Ind. (Utah material), Nov. 7, 1912....	.155	.097	1.142	1.006	.832	.232	1.374	4.838

ANTENNAL SEGMENT NO. 1m.

Locality, date, etc	I.	II.	III.	IV.	V.	VI. (base)	VII. (fil't)	Total
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
La Fayette, Ind. (Utah material), Nov. 7, 1912. . . .	.155	.097	1.161	.968	.813	.213	1.374	4.781
La Fayette, Ind. (Utah material), Nov. 15, 1912. .	.174	.097	1.161	1.064	.929	.213	1.548	5.186
La Fayette, Ind. (Utah material), Nov. 15, 1912. . .	.174	.097	1.161	1.064	.929	....	....	....
La Fayette, Ind. (Utah material), Nov. 15, 1912. . .	.174	.116	1.084	.909	.871	.230	1.374	4.818
La Fayette, Ind. (Utah material), Nov. 15, 1912. . .	.174	.116	1.054	.909	.852	.213	1.393	4.711
La Fayette, Ind. (Utah material), Nov. 22, 1912. . .	.155	.096	.968	.909	.852	.232	1.393	4.605
La Fayette, Ind. (Utah material), Nov. 22, 1912. . .	.155	.096	.987	.909	.832	.213	1.374	4.566
La Fayette, Ind. * (Utah material), Dec. 6, 1911. . . .	.155	.096	1.054	.890	.832	....	....	....
La Fayette, Ind. * (Utah material), Dec. 6, 1911. . . .	.155	.096	1.103	.871	.871	.251	1.103	4.450
La Fayette, Ind. * (Utah material), Dec. 6, 1911. . . .	.174	.096	1.209	.987	.909	.232	1.471	5.099
La Fayette, Ind. * (Utah material), Dec. 6, 1911. . . .	.174	.096	1.209	1.026	.909	.232	1.451	5.098
La Fayette, Ind. * (Utah material), Dec. 6, 1911. . . .	.174	.096	.938	.909	.832	.271	1.122	4.342
La Fayette, Ind. * (Utah material), Dec. 6, 1911. . . .	.174	.096	1.006	.909	.852	.251	1.122	4.410
La Fayette, Ind. * (Utah material), Dec. 6, 1911. . . .	.174	.096	.987	.968	.929	.232	1.471	4.857
La Fayette, Ind. * (Utah material), Dec. 6, 1911. . . .	.174	.096	1.006	1.006	.948	.232	1.509	4.971
†La Fayette, Ind.* (Utah material), Jan. 23, 1913	.193	.096	1.161	1.064	.929	.232	....	....
†La Fayette, Ind.* (Utah material), Jan. 23, 1913 . . .	.193	.096	1.161	1.045	.890	.232	1.355	4.872

* On alfalfa in greenhouse.

† Measurements from living specimens.



MACROSIPHUM CREELII AND M. CORYLI.

Pupa.

General colour pale green, the head thorax and distal half of abdomen appearing to be scantily pulverulent, giving these parts a slight whitish tint; the rather prominent median longitudinal dorsal line of a darker green colour than that of the body and extending the entire length of the abdomen and thorax. Segments I and II of the antenna whitish green; the remaining segments pale, with a slight brownish tint, excepting the extreme tip of III and IV, the end of V, and all of VI, which portions are blackish. Eyes red. Legs with femora pale green, with an apparently light pulverulence; tibiæ of a very faint brownish tint, the tips dark brown; tarsi black. Basal one-half or one-third of cornicle pale green, the remainder with a pale brownish tint, and the tip darker. Cauda concolorous with abdomen.

Oviparous female.

In a lot of live specimens received from Mr. G. I. Reeves, November 20, 1911 (collected on alfalfa at Salt Lake City, Utah, November 15, 1911), two wingless females with typical oviparous female characters, namely, swollen hind tibiæ bearing numerous sensoria, were found, but upon closer examination one of these was found to be filled with young and no eggs, while the others appeared to contain no eggs and the eye spots of a single young within the body were to be seen. Later on specimens from this lot were reared which proved to be both physiologically and morphologically oviparous, but specimens were not preserved. These females differed from the usual wingless viviparous females by bearing 75 or more small, rather inconspicuous sensoria on the hind tibia and by having 7 to 11 circular sensoria on segment III of antenna.

The eggs are deposited on the foliage of alfalfa and from all observations the aphidid occurs on alfalfa, which is evidently its prime host, the year round.

This large green *Macrosiphum*, which so closely resembles the destructive pea aphis (*Macrosiphum destructor* Johns.) was first received from Mr. Cecil W. Creel of this bureau, who found it very abundant on alfalfa at Fernley and Lovelock, Nev., May 20 and 22, 1911. From reports this species is already a more or less troublesome pest on alfalfa in Utah and Nevada, and may become

as great a pest in the West as the destructive pea aphis is to peas in the East. This aphidid has been received from Messrs. G. I. Reeves, T. H. Parks, H. S. Smith, and E. J. Vosler, who collected it on alfalfa at Salt Lake City, Utah. It has also been collected by Mr. J. A. Hyslop on alfalfa at Pullman, Wash., May 25 and 26, and June 4 and 9, 1909.

Macrosiphum coryli.

Wingless viviparous female. (Fig. 12.—Plate II, figs. 5, 7.)

Head orange-red to brownish. Antennæ black, excepting segments I and II, which are concolorous with head; placed on

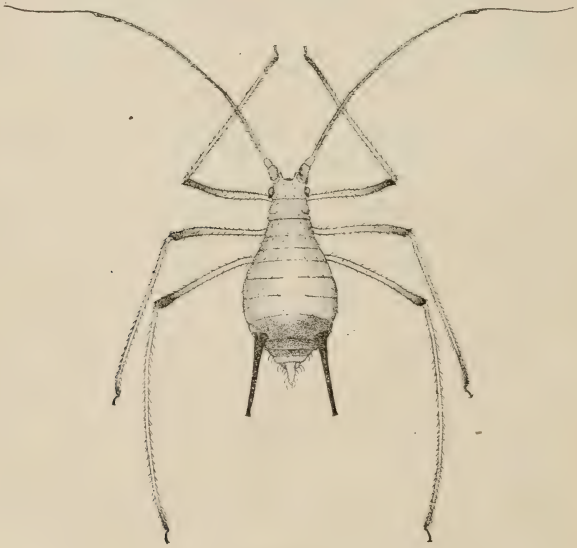


Fig. 12.

conspicuous frontal tubercles; sparsely hairy; very long, being about one-half longer than the body; filament of segment VI the longest; segment III with 3 or 4 circular sensoria in a row near the base; segments V and base of VI with the usual distal sensoria. Eyes dark red to reddish brown. Beak almost wholly black and

reaching to slightly beyond coxæ of third pair of legs. Prothorax concolorous with head; the mesothorax and metathorax brownish, the latter sometimes greenish, especially toward the posterior margin. Legs with femur pale yellowish brown, the tip blackish, tibia pale brown with black tip, and tarsus black; the hind tibiæ very long. Abdomen pale greenish, with a few pinkish dots which indicate the eyes of the embryos within; dusky patches around bases of cornicles; sides of abdomen usually more or less brownish to blackish, although this coloration is sometimes almost wholly wanting; dorsum of the last three abdominal segments usually more or less dusky. Older females have a slight pinkish tint intermixed with the green colour of the abdomen. Cornicles black, cylindrical, the distal fifth strongly reticulated, and very long, reaching the length of the cauda beyond the tip. Cauda pale to whitish green, moderately covered with long hairs, ensiform, and scarcely more than one-third the length of the cornicles.

Measurements from specimens preserved on slides in balsam: Length of body to tip of abdomen 1.74–2.21 mm., average 1.95 mm.; width of body 0.81–1.08 mm., average 0.97 mm.; length of middle tibia 1.80 mm.; length of hind tibia 2.4 mm.; length of tarsus 0.097 mm.; length of cornicle 0.83—1.00 mm., average 0.90 mm.; length of cauda 0.30 mm. Antennal measurements as follows:

ANTENNAL SEGMENT NO. 1m.

I.	II.	III.	IV.	V.	VI. (base)	VI. (filament)
mm.	mm.	mm. 0.956	mm. 1.061	mm. 0.783	mm. 0.174	mm. .....
.....	.....	.852	.869	.695	.164	0.991
.....	.....	.852	.939	.695	.164	.982
0.174	0.096	.852	.939	.748	.174	.....
.174	.096	.852	.947	.730	.191	.....
.....	.....	.991	1.104	.748	.174	.....
.....	.....	.956	1.026	.765	.164	.991
.174	.096	.921	.921	.713	.157	1.113
.174	.104	.921	.956	.721	.157	1.165
.157	.096	.765	.800	.643	.157	1.043
.157	.096	.765	.783	.609	.157	1.099

Winged viviparous female. (Plate II, figs. 8, 10.)

Head pale to reddish brown, sometimes with a faint greenish tint, especially at the margins. Antennæ brownish to black, excepting segments I and II, which are dusky; sparsely hairy; filament of segment VI the longest; total length much more than body length; 9 to 13 (usually 9 to 10) circular sensoria in a row on III and the usual ones on V and base of VI. Eyes dark red. Thorax pale brown. Fore wings with the usual twice-branched media; first anal and cubitus conspicuous and with a prominent border. Legs as in the wingless form. Abdomen pale green, with a blackish ring on the dorsum surrounding each cornicle and a dusky area extending across the dorsum posterior to the cornicles. Cornicles black, cylindrical, gradually tapering toward the apex, which is about one-half the diameter of the base, extending much beyond tip of abdomen, and with the tip reticulated. Cauda pale yellowish green, ensiform, and moderately hirsute.

Measurements from specimens on slides: Length of body 1.62–2.05 mm., average 1.9 mm.; width of body 0.70 to 0.90 mm., average 0.79 mm.; length of fore wing, average, 3.17 mm.; width of fore wing, average, 1.08 mm.; length of middle tibia, average, 1.82 mm.; length of hind tibia, average, 2.34 mm.; length of hind tarsus, average, 0.097 mm.; length of cornicle, average, 0.87 mm.; length of cauda, average, 0.25 mm. Antennal measurements as follows:

ANTENNAL SEGMENT NO. 1m.

I.	II.	III.	IV.	V.	VI. (base)	VI. (filament)
mm. 0.156	mm. 0.087	mm. 0.852	mm. 0.887	mm. 0.678	mm. 0.156	mm. 1.009
.156	.087	.852	.974	.678	.174	1.009
.156	.096	.904	1.026	.713	.174	.....
.156	.087	.782	.817	.678	.156	.....
.156	.087	.748	.782	.678	.156	.....
.156	.087	.835	.817	.661	.156	1.009
.156	.087	.956	.974	.756	.165	.....
.156	.087	.904	1.026	.782	.174	.....
.156	.087	.782	.819	.696	.174	1.026
.156	.087	.748	.800	.678	.174	1.061

Immature individuals are entirely pale green.

This species lives gregariously on the underside of the leaves and tender terminal shoots of hazel (*Corylus americana*). Described from specimens collected at La Fayette, Ind., July 5, 1912. The writer has also collected this aphidid at Chicago, Ill., May 20 and July 10, 1908.

(To be continued.)

WISCONSIN BEES OF THE GENUS PERDITA. GEOGRAPHICAL DISTRIBUTION AND RELATIONS TO FLOWERS.

BY S. GRAENICHER, PUBLIC MUSEUM, MILWAUKEE.

In 1896 Prof. T. D. A. Cockerell[1] published a paper on this genus, containing a vast amount of information, and dealing with the various aspects of taxonomy, variation, distribution, relations to flowers, etc.

The centre of distribution is located in the arid region of the Southwestern United States, New Mexico having an especially large percentage of species in its fauna. Prof. Cockerell states "that in the main we have to do with an austral series of types, which have spread northward and become largely differentiated into species since the glacial epoch." A splitting up into a great variety of forms is evident, and, as Prof. Cockerell puts it, "we have indeed the process of evolution going on under our eyes, the puzzling forms being those which have only lately segregated themselves, and have not yet developed striking peculiarities."

Another characteristic feature of this genus lies in the fact that all of the species, so far as their habits are known, are oligotropic, i.e., most of them depend for their pollen-supply on a single species of flower, and those that collect pollen from a number of plant species, favour closely related forms, belonging either to the same genus, or at least to the same family. New Mexico and Colorado offer extremely favourable opportunities for the study of the close relations between the various forms of Perdita and the

1. Proc. Acad. Nat. Soc. Phil., Vol. 48, pp. 25-107. Two years ago the author published "A list of the bees of the genus Perdita Smith" in Psyche, Vol. 18, pp. 134-143 (1911).

various forms of flowers, and Prof. Cockerell's paper referred to above is full of details on this particular subject.

At the time of its publication only two out of a total of seventy-one species were known to inhabit the States east of the Mississippi River, viz., *P. octomaculata* (Say.), a northern species, ranging according to the records then on hand from Illinois to New Hampshire, and *P. obscurata* Cr., a southern species, occurring in Georgia and Florida. None had been reported from Wisconsin. Our present knowledge brings the number of eastern species up to twelve, the following six of which belong to the Wisconsin fauna: *pallidipennis* Græn., *bruneri* Ckll., *maura* Ckll., *maculipennis* Græn., *citrinella* Græn., and *gerhardi* Vier.

P. pallidipennis Grænicher. This was described[2] from specimens taken in Burnett Co., Wis., at various places on the St. Croix River, a tributary of the Mississippi, which forms throughout the greater part of its course the boundary between Wisconsin and Minnesota. It has since been found at a number of points on the Mississippi River as far down as Rutledge in the southwestern corner of Wisconsin. I have also come across this species in the Waukegan-Kenosha dune region along Lake Michigan in northeastern Illinois and southeastern Wisconsin. Like the western *P. albipennis* Cr., it favours the sunflower-type of Compositæ, and has been observed gathering pollen from the sunflower *Helianthus occidentalis* Riddell, *Rudbeckia hirta* L. (black-eyed Susan), and *Lepachys pinnata* (Vent.) T. & G. (gray-headed cone-sunflower).

In 1907 Professors M. H. Swenk and T. D. A. Cockerell[3] described *P. lacteipennis*, a species from Nebraska, taken most frequently on the common sunflower *Helianthus annuus* L., and of which they state that it "is quite close to *albipennis* but differs at once in its larger size and in a reduction of the yellow markings." Last year Mr. J. C. Crawford[4] described *P. canadensis* from Medicine Hat, Alberta, Canada. This species forms together with *lacteipennis* from Nebraska and *pallidipennis* from Wisconsin a group of very closely related forms, all of which are to be considered recent offshoots of the sunflower visitor *albipennis*, or at

2. Can. Ent., Vol. 42, pp. 101-104; 157-160 (1910).
3. Ent. News, Vol. 18, pp. 51-58.
4. Can. Ent., Vol. 44, p. 359-360 (1812).

least as having arisen from the same stock that produced the latter. Compared with *albipennis* the three species under consideration all show a reduction of the yellow markings, in which the face, the legs and the abdomen are mainly involved; so far as the reduction of the face marks is concerned, *canadensis* has reached the point, where the face is entirely free of yellow.

The species mentioned above favour, so far as their habits are known, flowers that are typical elements of the Prairie Province. According to Pound and Clements [5] the vegetation centre of the prairies is situated in Nebraska, Iowa, Kansas and the Dakotas, and as one moves away from this centre in a northerly or southerly direction, a decrease in the number of characteristic plant species is noticeable. The Prairie Province, as defined by Pound and Clements forms a broad strip, bounded on the west by the Rocky Mountains, and extending from the Canadian Provinces Athabasca, Alberta, Saskatchewan, Assiniboia and Manitoba down through Montana and North Dakota and the states south of these into Texas. From this strip an arm runs off eastwardly through southern Minnesota and Iowa into southern Wisconsin, northern Illinois and a very narrow portion of western Indiana.

The known range of *albipennis* occupies a part of the vegetation centre (South Dakota and Nebraska), and passes through Colorado and New Mexico into Texas. It occurs, according to Swenk and Cockerell, all over the State of Nebraska, while *lacteipennis* covers the western part of that state only. *Canadensis* is an inhabitant of the most northern outposts of the Prairie Province, and *pallidipennis* is a species of the eastern extension of the prairies in Wisconsin and Illinois. As regards the distribution of this species in Wisconsin, attention is called to the fact that floral elements of the prairie extend their range northward to the sandy areas along the St. Croix River, the so-called "pine-barrens." At the mouth of the Yellow River (a tributary of the St. Croix) in the northern part of Burnett Co. (latitude about 46°) there is quite an assemblage of prairie-plants, and this, the type locality of *pallidipennis*, marks the most northern point at which the bee has been found.

5. Bot. Gaz., Vol. 25, pp. 381-394 (1898).

P. bruneri Cockerell. The type locality of the species is West Point, Nebraska, and it has also been reported by Swenk and Cockerell from Lincoln in the same state. A single specimen of this bee, a visitor of the Compositæ, was collected by the writer from the flowers of *Rudbeckia hirta* near the Kettle River rapids of the St. Croix River in Burnett Co.[6] It is quite common in the Waukegan-Kenosha dune region of northeastern Illinois and southeastern Wisconsin, where it has been taken mostly at the flowers of *Helianthus occidentalis*, and occasionally at those of *Liatris scariosa* Willd. (Large Button Snake-root).

P. maura Cockerell, a visitor of the ground-cherry (species of Physalis) was described from Cedar Bluffs, Nebraska, and has since been reported by Swenk and Cockerell from other parts of that state.

In Wisconsin it was first met with at Milwaukee, and it has been found also at various points along our western border from Hudson on the lower St. Croix River (about 15 miles east of St. Paul, Minn.) down along the Mississippi River to Rutledge in the southwestern corner of the state. In Nebraska it has been observed late in the fall, at a time when the ground-cherries were probably out of bloom, on the flowers of Aster, but in Wisconsin I have never seen it visiting the flowers of any other plant except those of the ground-cherries *Physalis heterophylla* Nees, and *P. pubescens* L.

P. maculipennis Grænicher. Just south of the present city limits of Milwaukee, and a short distance from Lake Michigan is a sandy area of small extent, and this is the type locality of the species. In addition to the specimens collected here, and in a sandpit to the west of Milwaukee, a single specimen was taken two years ago in the Mississippi valley near Genoa, Vernon Co., about 12 miles south of La Crosse. Although I have observed this bee in its type locality for a number of years, it was not until last summer that I succeeded in finding the source of its pollen-supply, viz., the flowers of the white melilot (*Melilotus alba* Desv., Fam. Leguminosæ). On account of the fact that this plant has come to us from the Old World not long ago, we are led to the conclusion that *P. maculipennis* depended originally on some native plant of

6. Reported in Bull. Publ. Museum Milwaukee, vol. 1, pp. 221-248.

our region for its pollen, undoubtedly one of the Leguminosæ, and that through the gradual disappearance of that plant from our immediate surroundings, the bee was forced to turn its attention to some other suitable plant. A number of prairie plants still inhabiting this particular area 30 or 40 years ago have been driven out by the change of conditions due to the activity of man; other species have invaded the area, and among these the white melilot has been quite successful.

P. maculipennis was described from the female sex; a description of the male is given herewith.

Male.—Length 5-6 mm. Differs from the female as follows: Flagellum conspicuously light yellow underneath, labrum and face entirely yellow; this colour extends for a short distance above the antennæ, and runs obliquely up along the anterior orbits. A yellow stripe along the posterior orbits, narrow above, and widening out abruptly below. In addition to the yellow marks on tubercles, tegulæ and collar, there is a large yellow spot on the prosternum, a smaller one on the mesosternum, and one on the metapleura; in the smaller specimens these markings are poorly developed. In the larger specimens two yellow interrupted abdominal cross-bands on segments 5 and 6, besides those on segments 2 to 4. Front and middle legs yellow, black only on posterior surfaces of femora and tibiæ. Hind legs black with a broad yellow band anteriorly on the femur, and a narrow one on the tibia. Knees yellow. The black spot in the stigma is very conspicuous, rather more so than in the female.

Four specimens taken June 29, 1913, in the type locality near Milwaukee, Wis., flying around the flowers of the white melilot (*Melilotus alba* Desv.) in search of the females.

P. citrinella Grænicher. This species, a visitor of the flowers of a leguminous plant. *Petalostemum villosum* Nutt. is known from two localities in Wisconsin: North Hudson, St. Croix Co. (type locality), and Prescott, Pierce Co., about 15 miles south of North Hudson. Last year it was reported by Mr. J. C. Crawford (loc. cit.) from Medicine Hat, Alberta, Canada.

It belongs to a group of yellow Perditas, and, as has been pointed out in the description of the species, it stands in exceedingly close relationship to two western species. One of these (*perpallida*

Cockerell, Nebraska) visits, like *citrinella*, the flowers of a species of Petalostemum; the other (*wootonæ* Cockerell) occurs in New Mexico, Colorado and Nebraska, and is a visitor of *Nuttallia* (Fam. Rosaceæ). A more extended acquaintance with the bees of this group inhabiting the prairies east and north of Nebraska may prove that *citrinella* is simply a colour variety of *perpallida*.

P. gerhardi, Viereck. Up to the present time this species has not been found outside of the Lake Michigan dune region. A visitor of the horsemint (*Monarda punctata* L.), it was described from specimens collected at East Chicago, Indiana, by Mr. Wm. J. Gerhard of the Field Museum of Chicago. Last year several specimens were taken by the writer in the dunes south of Kenosha, Wis., on the flowers of the horsemint. I have come across this plant in the Mississippi Valley as far north as Prescott, Pierce Co., Wis., in some places growing in abundance, but in spite of a sharp lookout for the bee *P. gerhardi*, no specimens were obtained.

This species, a yellow Perdita, belongs to the *perpallida—wootonæ—citrinella* group discussed above; it has, in the female sex (I do not know the male of *citrinella*), very much the appearance of a small *citrinella*, differing from the latter in the size and arrangement of the black markings on the yellow background. We are dealing with a species derived from the same source as *citrinella*, but depending for pollen on the flowers of a plant belonging to a different family (Labiatæ) than that visited by *citrinella*, and to a different region; it is a plant of the eastern United States, the western range of which brings it in contact with elements of the prairie region.

SUMMARY

Of the six species of Perdita known from Wisconsin, two are visitors of the Compositæ, two of the Leguminosæ, one of the ground cherries (species of Physalis), and one of the horsemint (*Monarda punctata*).

They are derived from the bee fauna of the Prairie Province, and have followed in the wake of the floral prairie elements that invaded the Wisconsin area. *Albipennis*, a western form, occupies the centre of vegetation of the prairies, and ranges southward to Texas. Grouped around this are three forms, one of which, *lacteipennis*, occurs together with *albipennis* in western Nebraska; the

other two inhabit ,according to our present information, the outskirts of the Prairie Province, *canadensis* being known from the northern end of that province in Canada, and *pallidipennis* from the eastern extension of the prairies in southern Wisconsin and northern Illinois. *Pallidipennis* and *bruneri*, both of them oligotropic bees of the Compositæ favour the sunflowers (species of Helianthus), and flowers of the same structural type, such as Rudbeckia and Lepachys.

Maura visits in Wisconsin Physalis, the same as in Nebraska.

Citrinella and its Nebraskan representative *perpallida* are both prairie-clover visitors, the former favouring the flowers of *Petalostemum villosum*, and the latter those of *P. violaceum*.

In its type locality in the vicinity of Milwaukee, *maculipennis* obtains its pollen from the white melilot, a species of Leguminosæ introduced from Europe. This means, of course, an adaptation to new conditions brought about by the fact, that the native plant or plants visited originally by this bee do not occur in the type locality at the present time. In all probability the bee will be found in some other part of its range at the flowers of some small-flowered species of Leguminosæ of the genera Petalostemum, Amorpha or Lespedeza.

While *citrinella* has remained true to a plant of the prairie region (Petalostemum), *gerhardi*, a near relative of the former has entered into relations with the horsemint (*Monarda punctata*), a species of eastern distribution.

PROSOPOTHRIPS COGNATUS, A NEW NORTH AMERICAN THYSANOPTERON.

BY J. DOUGLAS HOOD,
U. S. Biological Survey, Washington, D. C.

The genus *Prosopothrips* was erected by Uzel in 1895 for the reception of a single Bohemian species of anomalous structure, to which he gave the specific name *vejdovskyi*. The species is now known only from females taken in Bohemia (Uzel), Finland (Reuter), and Italy (Buffa). Consequently, the occurrence in North America of what appears to be a second species of the genus, and the discovery of the male, are matters worthy of record, especially since Mr. E. O. G. Kelly, who collected the

species, says in a recent letter that he has worked up an interesting paper on its economic importance. It is regretted that specimens of *P. vejdovskyi* could not be secured for comparison with the American form.

Prosopothrips cognatus sp. nov. Figs. A and B.

Female.—Length about 1.2 mm. Head and prothorax dark chocolate brown, nearly black; pterothorax and abdomen orange yellow, the last abdominal segment and the anterior angles of the mesothorax tipped with brown or gray; antennæ yellow, darkened with brown beyond middle of segment 6; fore legs largely brown, middle and hind legs yellow.

Fig. 13.—*Prosopothrips cognatus* Hood. A—Head and prothorax, female. B—Right antenna, female.

Head about 1.4 times as wide as greatest exposed length, prominently reticulate-rugose, with a dark chitinous line bordering the eyes within; vertex sulcate, two prominent projections overhanging the basal segments of the antennæ; cheeks swollen, but without spine-bearing tubercle; no macrochætæ present. Eyes not prominent, not protruding, slightly flattened laterally. Ocelli wanting. Antennæ one and two-thirds time as long as width of head; segment 1 short, distinctly shorter than 2 and very broad; 2 unusually large, narrowed toward apex and with short, slender pedicel; 3-5 slender, equal in length, similar in form, each with about four encircling lines of sculpture; 6 slender, longest in entire antenna, with about six encircling chitinous lines; 7 and 8 short and slender, forming a stylus; segment 1 brownish yellow; 2 orange; 3-5 yellow; 6

yellow in basal half or third, beyond nearly black; stylus nearly black.

Prothorax very slightly broader than long and about one and one-fourth times as long as width of head, broadest at posterior third; surface roughened; bristles short, scattered. Meso- and metathorax yellow, without differentiated dorsal plates, the former with anterior ventral angles darkened with brown or gray. Wings totally lacking. Legs short, stout, rugose; fore femora brown, fore tibiæ yellow apically and along middle, tarsi yellow; middle and hind legs yellow.

Abdomen rather large and heavy, about 1.6 times as wide as prothorax, broadest at segment 6; segment 10 with a longitudinal dorsal suture; all bristles very short and inconspicuous.

Measurements of holotype: Length 1.16 mm.; head, length of exposed portion .108 mm., width .150 mm.; prothorax, length .192 mm., width .204 mm.; pterothorax, width .220 mm.; abdomen, width .324 mm. Antennal segments: 1, 27μ; 2, length 42μ, width 34μ; 3, length 36μ, width 22μ; 4, 36μ; 5, 36μ, 6, 56μ; 7, 10μ; 8, 13μ; total length of antenna, .26 mm.

Male.—Much like female, but smaller (length .7 mm.). Segment 9 of abdomen with two pairs of dorsal spine-bearing tubercles, the posterior pair more widely separated than the anterior.

Measurements of allotype: Length .696 mm.; head, length of exposed portion .090 mm., width .116 mm.; prothorax, length .138 mm., width .152 mm.; pterothorax, width .160 mm.; abdomen, width .196 mm.

Described from two females and one male, taken at Wellington, Kansas, August, 1910, on wheat, by E. O. G. Kelly.

Though apparently very close to *P. vejdovskyi* Uzel, an uncommon European species, it differs in several important respects from the description and figures given by Uzel in his "Monographie." *Cognatus* has much stouter antennæ, with the first segment completely hidden in dorsal aspect by the vertical protuberances; the eyes are less prominent; the genal tubercle is flattened and the spine borne conspicuously at the tip in *vejdovskyi* is greatly reduced in size in *cognatus;* and, finally, the mesothorax of *cognatus* is yellow instead of black.

A NEW GENUS OF *SCELIONIDÆ* FROM AUSTRALIA.

BY ALAN P. DODD, NELSON, QUEENSLAND.

Subfamily *Baliniæ*.

Acolomorpha, nov. gen.

♀.—Head transverse, a little wider than the thorax; mandibles broad, tridentate; maxillary palpi 2-jointed. Antennæ 6-jointed (really 7-jointed since a small ring-joint is present), scape, pedicel, 3 funicle joints and a solid club. Thorax and forewings as in *Acolus* Forester. Abdomen broadly sessile, no wider or longer than the thorax; first and second segments short, transverse; third segment occupying two-thirds of the abdominal length.

Type: *Acolomorpha minuta* described herewith.

Acolomorpha minuta, n. sp.

♀.—Length 0.75 mm.

Shining black; legs and antennæ black.

Head and thorax with very fine polygonal sculpture. Abdomen with first and second segments striate; third segment smooth. Antennæ short; scape equal to pedicel and funicle joints combined; pedicel one-half longer than wide; first funicle joint as wide as the pedicel and almost as long; second and third much narrower than the first, short, transverse; club large, one-half longer than wide, as long as the scape. Forewings reaching some distance beyond apex of abdomen; narrow, infuscated; longest marginal cilia equal to two-fifths the greatest wing width; discal cilia fine and dense; submarginal vein attaining the costa about the middle of the wing; marginal vein as long as the stigmal, which is short, a little oblique; basal vein rather short, perpendicular.

[From 1 specimen 2/3 inch objective, 1 inch optic, Bausch and Lomb.]

Habitat: North Queensland (Nelson, near Cairns). Described from one ♀ caught by sweeping in forest, 12th August, 1913 (A. P. Dodd).

Type: In the South Australian Museum, a female on a slide.

NOTES ON THE WINTER AND EARLY SPRING COLEOPTERA OF FLORIDA, WITH DESCRIPTIONS OF NEW SPECIES.

BY W. S. BLATCHLEY, INDIANAPOLIS, INDIANA.

In 1911, and again in 1913, I spent the time from January 10 to April 15 in Central and Southern Florida, collecting especially Coleoptera, Orthoptera and Hemiptera, but also taking what came readily to hand in other orders. In the Canadian Entomologist for November, 1912, and January, 1913, I made mention of the places where I collected the first trip and described with notes a number of apparently new species.

In 1913 I made my headquarters at Dunedin, a small town on the Gulf Coast about twenty miles northwest of Tampa, and the bulk of my collecting was done in the immediate vicinity of that place. However, on February 18, a companion and I placed a small boat in Lake Tohopekaliga at Kissimmee, and with tent, cooking outfit and supplies, made our way down through three or four lakes, the largest of which was Lake Kissimmee, then down the river of that name to Lake Okeechobee, around the northern and eastern sides of that large body of water, then across it and down the Caloosahatchee River to the Gulf Coast below Fort Myers. Our trip occupied twenty-six days and was somewhat hurried, as my companion was a fisherman and hunter, little interested in entomology. As a consequence, most of my collecting was done in early morning, at the noon stops, and in the evenings after the camp duties had been completed. However, I had one full day at Kissimmee, three on the west shore of Lake Istokpoga, and a like number on the southwestern end of Pelican Bay, Lake Okeechobee, just east of Kreamer Island.

From the town of Kissimmee to the upper end of Lake Okeechobee the distance, as the crow flies, is about eighty miles; but, as the river runs, it is 240, the channel winding its way back and forth across a swamp, twenty to twenty-five miles in width, for the whole way. In only a few places are the banks of this river and Lake Okeechobee five to eight feet above the water, in most places not averaging that many inches. Cypress and bay trees, with branches thickly loaded with the long pendent "Spanish moss," scrub live oak, elbow brush and swamp elder, covered with

semi-tropical vines of many kinds, form the prevailing vegetation along the banks, while pickerel weed, water hyacinth, arrow heads, sawgrass and spatterdock fill the marshes. Along Lake Okeechobee a custard apple and wild papaw become plentiful, while here and there a rubber tree with spreading branches rears its head above the underbrush. My main collecting was done by beating and by overturning drift along the shores, though in a few places I was able to do some sweeping and sifting.

At Dunedin, and later on at Sanford, Eustis and Ormond, collecting was done in all possible ways. Of the insects taken during the trip of 1913 only the Coleoptera have been mounted and studied. About 900 species of these were secured during the two seasons. Could I have remained through May, probably as many more could have been taken, as the spring broods were just coming out in numbers when I had to leave.

Brief notes on the occurrence of a few of the rare or little known species will be given in this and a succeeding paper, together with descriptions of a number of forms apparently hitherto undescribed.*

209.**—**Pasimachus strenuus** Lec. A single example of this large Scaritid was taken near Ormond, March 24, from beneath a chunk in open pine woods. Length 37.5 mm.

Scarites californicus Lec. A half dozen or so from beneath logs half buried in the beach sand. St. Petersburgh, January 23; Dunedin, January 20. Smaller than *subterraneus* Fab., much more shining and with the striæ of elytra almost obliterated. The two can be separated at a glance, though *californicus* is not recognized in our lists. Length 15—17 mm.

535.—**Pterostichus morio** Dej. A single specimen at Dunedin, January 17, from beneath chunk near border of lake.

536.—**Pterostichus faber** Germ. This was the most common species of *Pterostichus* taken, having been secured in six widely separated localities. Schwarz lists it as "very rare." It occurs singly or in pairs beneath rubbish along streams or ponds. Of this genus and *Evarthrus* I took but five species in the two winters,

*Notes on 55 other species of Coleoptera taken by me at Ormond in the early spring of 1899 will be found in the appendix to my "Nature Wooing at Ormond by the Sea."

**The numbers are those of the Henshaw Check List and Third Supplement.

and Schwarz lists but six, three of which are identical with mine. In Indiana thirty species have been taken, while in individuals they are here among the most common of the Carabidæ.

Diplochila nupera Casey. A single example from the border of Arch Creek (eight miles north of Miami), March 21. Readily distinguished by its small size and the rectangular hind angles of thorax. Length, 10 mm.

719.—**Dicælus quadratus** Lec. One specimen at Fort Myers, March 6.

720.—**Dicælus carinatus** Dej. One specimen from near St. Petersburgh, January 17. Both this and the preceding from beneath chunks in low damp woods.

935.—**Pinacodera platicollis** Say. A number were beaten from large bunches of "Spanish moss" (*Tillandsia usneoides* L.) at Dunedin, Lake Okeechobee and Ormond.

992.—**Chlænius herbaceus** Chev. Twenty or more specimens of this beetle, usually regarded as very rare, were taken from beneath boards, etc., along the borders of some small fresh water lakes just back of Dunedin. January 21-April 1.

1132.—**Selenophorus fossulatus** Dej. Common beneath dried cow dung in open pine woods near Sarsota. February 15—March 2.

1152.—**Acupalpus longulus** Dej. Taken by sifting at Dunedin, Lake Okeechobee and Sanford, January 24—March 30.

Canthydrus floridanus, sp. nov.

Short, ovate, strongly convex. Head and thorax reddish-yellow, with a blackish or fuscous cloud on occiput and middle of apical half of thorax; elytra dark brown; antennæ, under surface and legs pale reddish-yellow. Head and thorax without punctures except a few coarse ones along the basal half of latter. Elytra with numerous irregularly placed, very shallow punctures. Length 2—2.2 mm.

Described from five specimens taken from beneath rubbish at Kissimmee and on the southeastern shore of Lake Okeechobee, February 16—March 6.

Shorter and more strongly convex than either *gibbulus* Aube or *puncticollis* Crotch. Prosternal process between the front coxæ narrower and elytral punctures finer and more shallow than in either.

Cælambus princeps, sp. nov.

Broadly oval, subdepressed above, strongly convex beneath. Head, elytra and narrow front and hind margins of thorax dark reddish or piceous brown; disc of thorax, under surface and legs pale reddish brown; antennæ and palpi still paler. Eyes very finely granulate, separated by one and one-third times their own diameters. Clypeus broadly rounded, finely but distinctly margined. Head and thorax finely, sparsely and irregularly punctured; elytra conjointly one and one-fourth times longer than wide, a little more coarsely, more regularly and aciculately punctate; both they and the under surface very finely and indistinctly alutaceous. Meso- and meta-sterna and abdomen finely, sparsely and irregularly punctate, the punctures shallow. Length 4.5 mm.; width 2.8 mm.

Described from a single example taken March 6 from beneath decaying water hyacinth on the southeast shore of Lake Okeechobee.

Mr. John D. Sherman, Jr., of Mount Vernon, New York, a special student of the Dytiscidæ, to whom the specimen was sent for examination, says, "It is undoubtedly a new and very striking species, in size and shape reminding me of *Pachydrus brevis* Sharp from Porto Rico."

1661.—**Helopeltis larvalis** Horn. One, March 4, from beneath chunk half buried in the mud of a tide-water marsh near Sarasota.

Megilla fuscilabris decepta, var. nov.

Form of the common *fuscilabris* Muls. (*maculata* DeG,.) but smaller. Ground colour above a paler red. Head wholly black; thorax with four small black spots on the basal half, these arranged either obliquely in pairs in the form of a little crown, or with the front pair united behind to form a small V, or with all four united making an irregular crescent which encloses a small red spot in front of scutellum; elytra with the subapical spots of *fuscilabris* usually united to form a common spot on the suture; tibiæ more or less reddish, especially so near base. Length, 5 mm.

Swept from low herbage. Sanford, March 28; Ormond, April 14. Mr. Chas. W. Leng, of New York City, has nine specimens from the Angell collection taken at Key West, Fla., without date. Both *fuscilabris* Muls. and *floridana* Leng have a large pale triangular

spot on head, this very rarely wanting in the former. *Fuscilabris* has two common sutural spots and four spots on each elytron; *floridana*, one sutural spot and five spots on each elytron, while *decepta*, in all but one or two of the known specimens, has three sutural spots (scutellar, postmedian and subapical) and three spots on each elytron. The spots are much larger than those of *floridana* and, excepting the scutellar one, more subequal in size than in either of the other forms. The upper surface is much less distinctly alutaceous than in either. I found *floridana* to be quite common in February on the spatter-dock (*Nymphæa advena* Soland.) along the Kissimmee River.

Neoharmonia venusta dissimila, var. nov.

Differs from the typical *venusta* in being more rotund; in having the head wholly black, the black spots of thorax enlarged and coalesced to form a single large three-lobed discal blotch, the median lobe of which reaches the front margin; and in the four median black spots of elytra being wholly wanting, thus leaving the two basal spots on each, and the common irregular subapical cross-bar. Length 6.5 mm.

One specimen beaten from elder blossoms on the southeast shore of Lake Okeechobee, March 6. Mr. Wm. T. Davis, of New Brighton, Staten Island, New York, reports that he has a specimen of var. *dissimila* very similar to the one above described, but having the thorax coloured as in typical *venusta*. It was beaten from the black willow (*Salix nigra* L.) on the shore of Plummer's Island, Maryland. June 25, 1911.

Neoharmonia notulata Muls. One beaten from oak shrubs on Istokpoga Creek, February 26. It has the thorax coloured as in the above variety of *venusta*, the elytra black with a large irregular red spot on middle of each.

Psyllobora 20-maculata pallidicola, var. nov.

Smaller and paler than *20-maculata*, not alutaceous and much less distinctly punctate; thorax wholly pale, without the spots seen in that and other described forms. Elytra without common sutural spots, the others rather large and well defined, with three near middle of disc more or less connected. Length 1.8—2 mm.

Beaten from foliage of the wax-myrtle or bayberry (*Myrica cerifera* L.), Dunedin, January 18; Lake Istokpoga, February 25; Ormond, April 13.

I have followed Leng in making this a variety of *20-maculata* Say, though it is my opinion that in time all the more southern non-alutaceous and finely punctate forms will be recognized as distinct from that common northern species, though closely related among themselves.

3086.—**Axion tripustulatum** DeG. Quite common on oak and myrtle near Dunedin; also at Bassenger, Arch Creek and other places. January 24—March 30.

9906.—**Novius cardinalis** Muls. Five examples of this introduced species were beaten from wild grape along the borders of a large orange grove near Dunedin, January 20.

Aditoma bifida Casey. This peculiar Colydiid was taken in small numbers both at Sanford and near Oneca, January 13—February 10. It occurs beneath the bark of dead pine in open woods.

Trogoderma fascifera, sp. nov.

Oblong-oval, robust. Black, feebly shining; elytra with a common broad dark red antemedian band, the hind edge of which is concave on each elytron, and the front one more broadly and obliquely so; tibiæ, tarsi and basal joints of antennæ reddish-brown. Eyes entire, rather small, widely separated. Antennæ of male serrate from the fourth joint. Head finely and densely reticulate-punctate. Thorax nearly twice as wide as long, as wide at base as elytra, sides feebly rounded into apex; disc with middle third finely and sparsely punctate, its sides punctate like the head. Elytra sparsely and finely punctate, each puncture bearing a short, prostrate grayish hair. Pro- and meso-sterna with large shallow variolate punctures; abdomen finely and rather densely articulate-punctate. Length 4.5 mm.; width 3 mm.

Described from a single male taken February 25 by sifting on the west shore of Lake Istokpoga. Readily known by its large size and the reddish cross-band of elytra which reaches from the middle more than half way to base, and sends a spur along each side of suture nearly to the scutellum. The prosternal process is feebly concave and finely carinate for its entire length, and the antennal fossæ are wider and more shallow than in our other species.

(To be continued.)

THE CASE OF *VANESSA CALIFORNICA*.

BY E. J. NEWCOMER, STANFORD UNIVERSITY, CAL.

The controversy between Prof. F. M. Webster and Dr. J. McDunnough over the occurrence of *Vanessa californica* in Northern California and Southern Oregon, and regarding its larval food plants, has interested me because I was in the region affected during a large part of July, 1911. Their articles appeared in the Canadian Entomologist for April, July and October of last year. Without antagonizing either gentleman by remarks concerning his statements, let me give an account of what I saw and recorded.

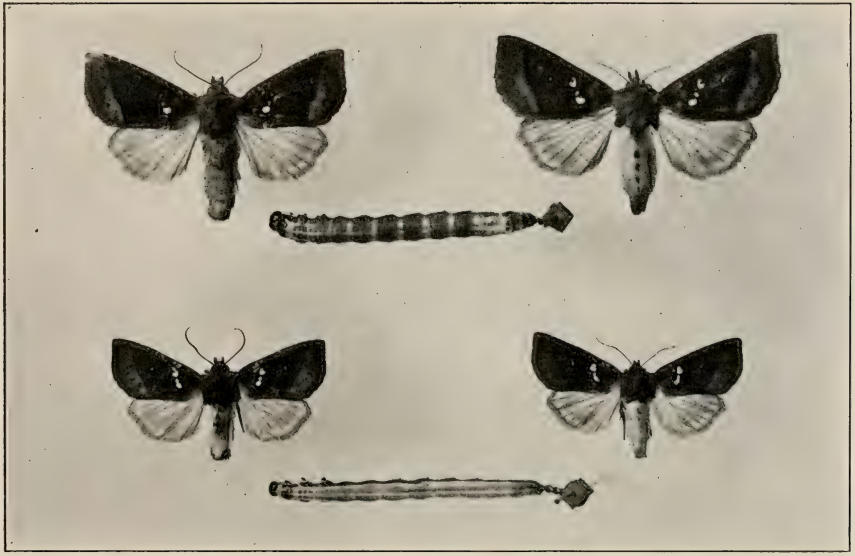
I spent two weeks, from the twelfth to the twenty-seventh of July, 1911, near Susanville, in Lassen Co., California, only a hundred miles or so south of Lakeview, Oregon, and in exactly the same sort of region—namely, open, arid country, irrigated and devoted largely to the raising of alfalfa, and bounded on the west by the wooded range of the Sierra Nevada. At the end of the two weeks, I went south through the Sierras for a hundred and fifty miles.

At Susanville, during the early part of my stay, I found numerous patches of "buck brush" or "snow brush" (*Ceanothus* sp.) in the timbered regions literally alive with the black, spiny, half-grown caterpillars of *Vanessa californica*. Frequently the bushes would be practically stripped, and the caterpillars would be found migrating in search of other bushes. By the time I was ready to start south, many of the caterpillars had pupated, and there were a few adults flying about. I saw numbers of skeletonized bushes with chrysalids suspended from their branches, and if a bush were shaken or disturbed, the chrysalids immediately started swinging back and forth, and would continue this motion for several seconds, producing a curious rattling sound. As I went farther south, I saw more of the butterflies, but I did not observe any large swarms, though a week or so later there were accounts in various newspapers concerning these swarms, and they were described to me by several persons who saw them.

Now for the worms which attacked the alfalfa and other field crops. While I was at Susanville, a farmer, hearing that I knew

something about insects, asked me to come down to his alfalfa patch and see what the worms were that were destroying the alfalfa. On the way I noticed considerable numbers of the butterfly *Colias eurytheme* flying about over the alfalfa, and I thought the worms might be the larvæ of this species, but an examination of the alfalfa failed to show any of them. However, on arriving at the farm house, I was taken out to a large field where the first crop of alfalfa had been cut and was lying on the ground in piles. The farmer turned over one of these piles, and beneath it were hundreds of half-grown cutworms, smooth, and of a greenish or gray colour, with some dark markings. By carefully looking around, I was able to find some of these scattered about the open field, but most of them were congregated under the piles of hay. The young shoots of the second crop of alfalfa, which begin to grow as soon as the first crop is cut, were being eaten back as fast as they grew, and it was evident that there would be little, if any, second crop. The field looked as dry and barren as a stubble field. Such were conditions in this particular patch. In the next field, which was separated from the first by an irrigating ditch, the second crop was flourishing and the field quite green. I failed to find more than a few cutworms in this field. Apparently but few eggs had been deposited here, and the worms in the adjacent land were unable to cross the ditch. During the same day I saw and heard of several other fields badly ravaged by the cutworm, but, though where present it was very numerous, it was by no means universally distributed through the alfalfa region in the vicinity of Susanville. The worms were without doubt cutworms or army-worms of the family *Noctuidæ*. I brought specimens to Stanford University, but was unable to determine the species. As I remember them, however, they were very similar in appearance to the common army-worm.

The farmers were at a loss to account for the sudden appearance of this pest, as they had not noticed the worms until they were half-grown, and one of them ventured the suggestion that they had come down in the last rain storm. He also suggested that a heavy roller passed over the field would kill many of the worms, and this, combined with a careful use of poisoned baits, would undoubtedly be the most effective means of controlling the pest.



PAPAIPEMA LYSIMACHIAE AND P. PURPURIFASCIA.

NEW SPECIES AND HISTORIES IN PAPAIPEMA SM. (LEPID.)

BY HENRY BIRD, RYE, N.Y.

(Continued from Vol. XLV, p. 126.)

More than ten years ago the writer encountered a *Papaipema* larva at Rye boring Loosestrife, *Lysimachia quadrifolia*, and in the interim a wide occurrence of its work has been noted. At that time the imago was successfully reared, and there was surprise that it appeared to be but a small form of the well-known *P. purpurifascia* G&R, which was known to have an indigenous foodplant in Columbine, *Aquilegia canadensis*. In 1902 (Can. Ent., vol. XXXIV, p. 118) attention was called to a difference between these larvæ, but the moths seemed so nearly identical except in size, it was believed the small diameter of the Loosestrife stems might account for the reduced size of the resultant moth.

As the years go by and more extended observations on the habits of the genus accrue, it is noticed how the Columbine feeders begin to emerge weeks in advance of the other, being one of the earliest of the local species in that respect. True, it continues to emerge for over a month and overlaps the Loosestrife feeder but there seems always two weeks difference with the earliest ones of the respective forms. The *Papaipemæ*, as with most mid-season moths, are quite prompt on the dates of their first appearance, and as these two larvæ often flourish within a few feet of each other, such discrepancy was a point to be considered. It is found the latter is much the commoner and more generally diffused, due doubtless to a more widespread foodplant. Finally, a familiarity with a large series of moths, resultant of personal field work from southern Canada to Delaware, makes clear the points of difference that are constant with the imago, and careful comparisons of the larvæ through their various stages, establishes the fact that we have clearly to do with two well-defined species. Of some weight in a general summing up, the Loosestrife feeder is found to be kept down by a parasite all its own, while *purpurifascia* falls to the general ones, mainly the *Hemiteles* and a *Ceromasia* fly, that are common checks throughout the genus.

Before considering more specifically this smaller, narrower winged species, which is clearly the more primitive of the two, it

is important to refer to the synonymy, since they have been always confused.

In 1862 Harris described the Columbine feeder as *Gortyna leucostigma*, (Ins. Inj. Veg.,p. 440), but this name was preoccupied. Grote and Robinson advanced the name *purpurifascia* in 1868 (Trans. Amer. Soc., vol. I, p. 341), describing from two specimens, and they clearly had both forms before them. They first, and at much length, described the Columbine form, a female, and their figure (plate 7, fig. 51), confirms what they clearly intended as representing their species. They described their other specimen, a male, last and in a few words, noting, however, the differences of ornamentation that are distinguishing features between the two forms. While it seems very clear, lest future questions arise, the name *purpurifascia* G&R, is herewith restricted to the above-mentioned female type of their description. This will accord agreeably to later interpretations and uses of the name, in the more important references where figures have been given. Slingerland, Can. Ent., vol. XXIX, 161 ; Holland, Moth Book, pl. XXVI, fig. 7; Hampson, Cat. Lep. Phal. Br. Mus., pl. CXXXVIII, fig. 25, all figure the Columbine borer as *purpurifascia*.

For the Loosestrife borer the following specific name is proposed:

Papaipema lysimachiæ, n. sp.

Size small, form and pattern typical, sexes similar. Head reddish purple, white scales at base of ciliate antenna; thoracic tufts and patagiæ edged in deeper purple. Abdomen of the luteous yellow of the secondaries, the tufts minute. Primaries rich yellow powdered with red brown, the basal, subterminal and median shade lines defined with the latter colour, and of usual delineation, the post median line double, the inner very finely drawn with red brown, the outer rather fasciate, dark purple or blackish, its course inwardly oblique and quite rigid after a sharp turn below the costa; subterminal line lunulate, fine, outwardly dentate on veins, emphasized as defining the glistening purplish subterminal space from the redder terminal area; a marginal line at base of purplish cilia. Basal spots, median field and apex of the bright yellow ground colour, the inner basal area and subterminal space reddish purple, the latter darkest and rather iridescent, but contrasts are not strong. The orbicular and double claviform show as three super-

imposed, pure white spots, united, except where cut by median vein, and linear, longer then with near ally. Reniform is of ground colour, inwardly marked at top and bottom by a white dot, never wholly white. Secondaries pale, luteous yellow with rows or purplish reflection that deepens in a marginal band. Beneath powdery, shaded with purplish. Size is very constant with no disparity in the sexes. Expanse, 27.5 to 31 mm. The male genitalia conform to the usual type pattern of the yellow species, the irregular, spinulated cucullus, the long curved harpe, dorsally edged in part with fine teeth, indicate the common generic features here. Habitat: Southern Canada and eastern United States generally through range of foodplant. Montreal and north shore of Lake Erie, Can.; Webster, N.H.; Buffalo, Albany, Staten Island, Rye, West Chester Co., N.Y.; Fairfield Co., Conn.; Newfoundland, N.J.; New Brighton, Pa.; Wilmington, Del. Type locality: To meet the desired exactitude, the locality of the particular male type example thus labelled is Polly Park Wood, N. 42 deg. W. 530 meters intersection of Purchase St. and Polly Park Road, Town of Harrison, West Chester Co., N.Y., U.S.A.

Twenty specimens showing equally the sexes are at hand. Paratypes will be placed in the U. S. National and British Museums; the male type with the author.

The larval period extends from the first week of June to Aug. 15, the larva hatching from the hibernated egg. As an instance of disparity, early *purpurifascia* moths begin to emerge by this last date. By the second larval stage the continuous dorsal stripe is conspicuous, that alone being unbroken. The colour is a warm shade of brown seemingly deeper on the middle by reason of the absence of side lines. In these early features it is similar to a dozen other species.

Stage IV.—Characteristics normal; head golden yellow, side marking not always present; body cylindrical, colour sienna brown, lines cream white, dorsal alone entire, a wide well-defined stripe; tubercles brown, IV the largest, about three times the size of spiracle, on joint ten III and IIIa tend to coalesce, IV large and low down, IVa above the line of spiracle and smaller.

Stage V.—Similar, the proportions cylindrical and attenuated.

Penultimate stage.—Little change, the ground colour lighter

and more of a pinkish hue, the cream-coloured lines hold their prominence, the subspiracular strong on thoracic joints; tubercles the same.

Maturity.—An exceedingly cylindrical larva of small diameter; the colour fades to a yellowish translucence, the demarkation of the lines is lost. Thoracic and anal plate of usual proportions, the former edged with black; tubercles have deteriorated in size, except on joint eleven I and II are the merest dots, IV holds its prominence, on ten IVa is sometimes wanting, but III and IIIa usually coalesce, on eleven their union is more clear. Setæ are weak and unnoticed without a lens. Larval length for the above stages: 24, 28, 31, 39 mm., respectively. General dates for pupation are August 12 to 18; for emergence, September 5 to 20.

The pupa is small and slender, light brown and shining, the white spots easily seen when about ready to disclose the moth; the cremaster is two fine spines curved at the point. Length 15 to 18 mm.

Lysimachiæ larvæ differ from *purpurifascia* in the character of the dorsal line, the size and colour of the body, while the tubercles of the latter are larger and black. The dorsal stripe is a larval character in the genus offering ready aid in differentiating certain sections. This line may be broken abruptly on the first four abdominal segments; it may cross this as a mere thread, or it may be a broad even stripe in its entirety. The Loosestrife borer is of the latter class, while *purpurifascia* has a narrow, thread-like line, indistinct and reduced on the joints in question especially in the earlier stages. They differ more autopically than the larvæ of such dissimilar species in the moth state, as *necopina* and *harrisii*. Throughout the month of June particularly the browned foliage of the Loosestrife here and there point out the presence of this larva where a stem has been bored, and died. It is always the upland, whorled, or four-leaved species, *quadrifolia*, that is selected by this larva, *L. terrestris*, a frequenter of wet places not being infested, though its stem would be more commodious. The latter is often bored by a straggling *cataphracta* or *marginidens*, but my experience is negative as concerns *lysimachiæ*. The former is very persistent, its running rootstocks often matting an area to the exclusion of other plants. The even whorled foliage massed in clumps quickly catches the eye, and forms a background on which

the leathery brown leaves of the bored stem stand out strongly. So one may note the presence of this borer in new territory, even from trolley car or railway train. The principal and only parasite found so far subsisting on this species has not yet been obtained in the imago. There are two or more broods of them surely, since as early as stage four many of the borers have succumbed and the parasites hatched by June 30. The parasitic larvæ that mature by August 10 hybernate after spinning up in a tough cocoon. It is an hymenopterous species, with a larva in miniature like that of *Sphecius*, having pointed, extensile, anterior segments, and attacks the host externally. They attain a length of four millimeters, subsist on the juices of the dead host, and mature rapidly, a necessity under the circumstances. From two to ten may infest one host, and they spin their flattened, tapering cocoons together in a mass in a nearby portion of the larval tunnel. At a late date in the fall they are yet unchanged to a pupal form. In our rather extended breedings of this group heretofore this parasite has not been encountered with any other species.

BOOK NOTICE.

THE BOMBIDÆ OF THE NEW WORLD. — Transactions of the American Entomological Society, XXXVIII, pp. 177-486, issued Feb. 4, 1913; XXXIX, pp. 73-200, issued July 17, 1913; 22 plates. By H. J. Franklin, Ph. D.

That this extensive monograph of the genera *Bombus* and *Psithyrus* has taken its turn as one of the regular series of papers published by the American Entomological Society, and has therefore appeared without any flourish of trumpets, will not obscure the fact that it is not only a work of great merit, recording the author's painstaking investigations into structural and other characters whereby the species of this somewhat difficult group are well separated with the aid of the material at his disposal—about 5000 North American and about 1000 South American specimens comprising many public and private collections, but also a work that is of especial value to Canadians because of the important position that bumble-bees occupy in the insect fauna of Canada. Of the 47 species of *Bombus* recorded from the region north of Mexico 37 have been found north of the United States

(*B. morrisoni* may be added, for it has been taken by the Rev. W. M. Roger at Ashcroft, B.C.), while no less than eleven of these have not been taken south of Canada. It can almost be said that no part of this vast country is without the bumble-bee, for the author mentions that *B. kirbyellus* Curtis has been taken at Port Foulke in 78¼ North Latitude. The same species has been met with on a high peak in New Mexico. In the Andes *B. opifex* has been taken at an altitude of 4000 metres and *B. coccineus* at 13,600 feet. Franklin says these are the highest New World records.

Like other modern workers on the Bombidæ, Dr. Franklin founds his classification mainly upon the structure of the genitalia of the males and finds that the New World species of *Bombus* fall into seven groups:

1. The Terrestris group, containing four species, the best known being *terricola* Kirby of the east and *occidentalis* Greene of the West, both energetic and prolific forms, as is *terrestris* in the palearctic. *Terricola* is probably heavily parasitised—it might more truly be said dragooned—here, as *terrestris* is in Europe by *Psithyrus vestalis* (sens. lata), of which the American form *ashtoni* Cr. has a similar distribution to that of *B. terricola*, though, as Franklin states, "there is not yet a single true New World account of a *Psithyrus* having been found in a *Bombus* nest."

2. The Borealis group, better known in Europe as the Subterraneus or Distinguendus group, comprising *borealis* Kirby in the northeast and *appositus* Cr. in the northwest.

3. The Dumoucheli group, containing four species north of Mexico, including the common Eastern species *pennsylvanicus* De Geer (= *americanorum* Fab.), which does not extend far into Canada, and the widely distributed *fervidus* Fab.

4. The Kirbyellus group, including five arctic and sub-arctic species.

5. The Pratorum group, containing no less than 23 species, or apparently distinct forms, in Canada and the United States.

The remaining two groups are made up of the species in which the males have bulging eyes, for which Robertson in 1903 erected the genus *Bombias;* (6) The Auricomus group comprising *auricomus* Robt. and *nevadensis* Cr. and (7) The Fraternus group, consisting of seven species, of which only three have occurred in

Canada, *separatus* Cr., *morrisoni* Cr., and the widely distributed and chameleonic *rufocinctus* Cr.

A second part of the work treats of the species south of the United States. Here we find as many as twenty species of the Dumoucheli group, if we include the four northern forms, of which two have already been taken in Mexico, sixteen of the Fraternus group, only four of the Pratorum group, and no representative of any other group.

Dr. Franklin follows five of his groups into the Old World, but thinks that the Auricomus and Fraternus groups are not certainly known to be represented there. He has probably not seen the male of *Bombus cullumanus* Kirby, a rare and little known European species, of which *rufocinctus* appears to be the nearctic representative. The name *dumoucheli* Rad. is not employed by European workers, but it appears to be synonymous with *armeniacus* a Central Asiatic form allied to *pomorum* Panzer, the type of a well known group in Europe. Reference is also made by Dr. Franklin to five other groups occuring in the Old World, but, so far as is known, absent from America.

The author treats the genus *Psithyrus*, consisting of the parasitic bumble-bees in the same thorough and liberal manner as *Bombus*. Eleven forms of *Psithyrus* have been separated in the region north of Mexico, but three of these are unpaired sexes. The only record of a *Psithyrus* from South America is that of F. Smith from Brazil, but Dr. Franklin doubts if it was ever taken there.

In his work Dr. Franklin introduces new names for six Bombid species north of Mexico and for ten species south of the Mexican border. In the case of some forms the relationships are so close that Dr. Franklin considers "it must be entirely a matter of personal opinion whether they should be given full species rank or considered only a subspecies," a view with which none at this date will quarrel. The author also buries as synonymous a large number of old names. That he is well qualified to do this is evident from the fact that he has seen and examined "practically all of the types of species described by the New World workers on the group."

The twenty-two plates consist of illustrations of various structures, chiefly camera-lucida drawings of the genitalia and of

the hidden seventh and eighth ventral segments of the males of the different species. These two segments are called by Franklin the inner and outer spathæ, a term to discover the meaning of which a new reader anxious to determine specimens may spend a minute or two.

Painstaking monographs of a small group such as this—Swenk's *Bee Genus Colletes* may be cited as another though much smaller example—in which structure is used as the basis of specific distinction and careful descriptions are freely supplemented by good drawings, published without either undue haste or delay, constitute construction work of the best kind, and entomologists must accord Dr. Franklin a hearty vote of thanks for the results of several years of patient labour. Who will treat in a similar manner other groups of bees and wasps now calling for revision, and thus help to reduce the heaps of half-worked ore that have accumulated in hymenopterology to ingots of bright metal? Careful investigators who undertake such work should receive the liberal support of collectors and curators. But to follow the suggestion of a speaker at the recent Convention of the American Association for the Advancement of Science at Cleveland, who proposed that a committee should be formed to apportion to each scientific investigator his task, would be to rob such work of its main attraction.

Dr. Franklin hopes at a later date to present a further paper on the Bombidæ, dealing chiefly with habits and phylogeny. This will be eagerly looked for.

F. W. L. S.

We regret to learn that Professor John Henry Comstock, who has been for thirty-nine years instructor and professor of Entomology at Cornell University, and the author of various text-books and works on the subject, will retire from duty at the end of the presentacademical year. His many friends throughout America join in wishing him many years of rest from educational duties, while no doubt he will continue his scientific work.

Mailed February 9th, 1914.

The Canadian Entomologist.

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NEW OR LITTLE KNOWN SPECIES OF APHIDIDÆ.

BY JOHN J. DAVIS, BUREAU OF ENTOMOLOGY, WASHINGTON, D.C.

(Continued from page 51.)

Wingless viviparous female. (Pl. IV, figs. 11–13.)

Macrosiphum venæfuscæ, n. sp.

Body uniformly pale green. Antennæ blackish, excepting segments I, II, and the extreme base of III, which are pale greenish brown; placed on prominent frontal tubercles; sparsely setose; 1 to 3 circular sensoria in a row on basal portion of segment III; filament of segment VI longest; total length greater than that of body. Beak just reaching to coxæ of third pair of legs. Eyes black. Basal half of femur with a slight greenish tint, the distal half pale brown; tibia and tarsus blackish. Cornicles black, reaching to or a little beyond tip of cauda; distal end plainly reticulated and noticeably constricted; gradually tapering, the tip being much narrower than base. Cauda approximately one-half the length of cornicles, ensiform, and sparsely hairy.

Measurements from specimens mounted on slides in balsam: Length of body 2.55—2.75 mm., average 2.67 mm.; width of body 1.20—1.35 mm., average 1.30 mm.; length of middle tibia 1.70—2.24 mm., average 1.98 mm.; length of hind tibia 2.44—3.02 mm., average 2.76 mm.; length of hind tarsus 0.135 mm.; length of cornicles, average 0.942 mm.; length of cauda, average, 0.516 mm. Antennal measurements as follows:

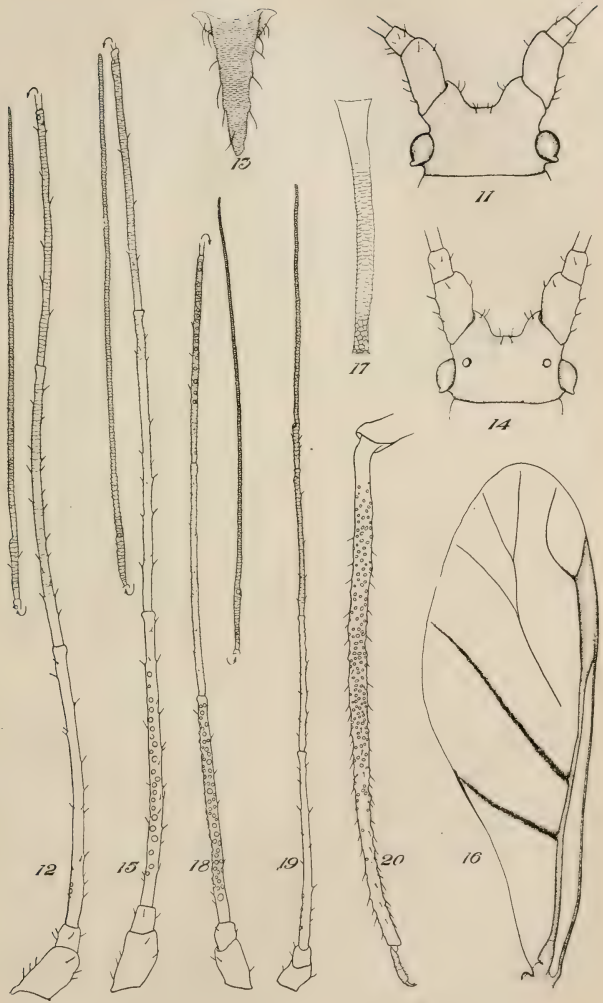
ANTENNAL SEGMENT NO. 1m.

I.	II.	III.	IV.	V.	VI. (base)	VI. filament
mm. 0.209	mm. 0.104	mm. 1.043	mm. 1.026	mm. 0.922	mm. 0.191	mm. 1.391*
.209	.096	1.043	1.043	.956	.200	1.565
.191	.087	.922	.835	.713	.....	.....
.226	.096	1.069	1.061	.922	.191	.....
.217	.096	1.069	1.078	.922	.191	.....
.209	.104	1.113	1.078	.930	.217	.....
.217	.096	1.113	1.018	.922	.209	.....
.226	.096	1.165	1.165	.922	.209	.....
.....	....	1.061	1.078	.904	.200	1.391†
....	....	1.069	.974	.887	.191	1.465†

*Slightly shriveled at extreme tip.
†Extreme tip apparently broken off.

Winged viviparous female. (Pl. IV, figs. 14—17.)

Head and thoracic plates very pale yellowish brown. Antennæ placed on prominent frontal tubercles; very long, being about one and one-half times the length of the body; sparsely setose; black, excepting segments I, II, and extreme base of III, which are concolorous with head; filament of segment VI longest; 14 to 24 (usually about 19) circular sensoria more or less in a row on segment III, and the usual distal ones on segments V and base of VI. Eyes black. Fore wings with the first anal and cubitus blackish, with a conspicuous fuscous border; other veins brownish and slender; media 1 and media 2 normally branching at one-half the distance where media 3+4 branches to the tip of wing. Femur pale green, excepting distal third, which is dark brown; tibia dark brown, with the tip black; tarsus black. Abdomen pea green in colour. Cornicles black, reaching to a little beyond tip of cauda, cylindrical and tapering toward tip, the base being nearly twice the diameter of the apex; distal end reticulated. Cauda concolorous with abdomen, ensiform, sparsely hairy, and approximately one-half the length of cornicles.



MACROSIPHUM VENAEFUSCAE

Measurements from specimens mounted in balsam on slides: Length of body 2.13—2.63 mm., average 2.38 mm.; width of body, average, 0.98 mm.; length of forewing, average, 4.10 mm.; width of forewing, average, 1.47 mm.; length of middle tibia, average, 2.05 mm.; length of hind tibia, average, 2.87 mm.; length of hind tarsus, average, 0.117 mm.; length of cornicles, average, 0.93 mm.; length of cauda, average, 0,45 mm. Antennal measurements as follows:

ANTENNAL SEGMENT NO. 1m.

I.	II.	III.	IV.	V.	VI. (base)	VI. filament
mm. 0.226	mm. 0.035	mm. 0.956	mm. 1.026	mm. 0.817	mm. 0.209	mm. .....
.217	.087	.947	1.043	....	....	.....
.226	.087	1.026	1.113	.922	.182	.....
.217	.087	1.026	1.130	.956	....	.....
.226	.035	.991	1.026	.904	.191	.....
.226	.104	1.036	1.113	.974	.191	1.809
.209	.087	1.078	1.113	.991	.200	1.791
.217	.087	1.036	1.043	.991	.226	.....
.209	.104	1.096	1.043	.956	.226	.....

Winged male. (Pl. IV, fig. 18.)

Entire body brownish pink to light red. Antennæ black, excepting segments I and II, which are a dusky reddish brown to blackish; very sparsely setose; placed on prominent frontal tubercles; total length greater than that of body; filament of segment VI longest; segment III with 53 to 67 circular, somewhat tuberculate sensoria, irregularly placed; segment IV bare of sensoria; segment V with 17 to 26 sensoria, not including the usual distal sensorium, somewhat regularly placed, and the usual distal ones on segment VI. Eyes blackish; ocelli prominent. Legs black, excepting basal half or third of femur. Wings as in winged viviparous female. Cornicles black, reaching a little beyond tip of cauda, cylindrical, and slightly larger at base than at apex; distal end

reticulated. Cauda concolorous with abdomen, ensiform, sparsely hairy, and about one-third the length of cornicles.

Average measurements from specimens recently mounted on slides in balsam: Length of body 2.23 mm., width 0.82 mm.; length of wing 4.20 mm., width 1.66 mm.; length of middle tibia 2 mm., of hind tibia 2.48 mm., of hind tarsus 0.116 mm,. of cornicle 0.67 mm., of cauda 0.203 mm.

Antennal measurements as follows:

ANTENNAL SEGMENT NO. 1m.

I.	II.	III.	IV.	V.	VI. (base)	VI. filament
mm. 0.156	mm. 0.087	mm. 0.852	mm. 0.869	mm. 0.782	mm. 0.208	mm. 1.478*
....	....	.843	.869	.765	....	.....
.174	.087	.904	1.026	.869	.200	.....
.156	.078	.895	.974	.878	.191	1.565
.174	.096	.904	.956	.749	.182	.....
.174	.096	.939	.939	.749	.182	.....
.165	.096	.922	1.051	.791	.182	.....
.174	.096	.939	1.069	.835	.191	1.548

* Extreme tip appears to be broken off.

Wingless oviparous female. (Pl. IV, figs. 19–20.)

Colour of head and thoracic segments between pale cadmium yellow and chrome yellow. Antennæ blackish, excepting segments I and II, which are dusky, and extreme base of III, which is pale; sparsely setose; filament of segment VI longest; 4 to 7 circular sensoria in a row on segment III and the usual distal one on segments V and base of VI. Eyes dark red. Beak reaching to coxæ of second pair of legs. Femur pale, becoming dusky at tip; tibia brownish, with the tip black; tarsus black. Hind tibiæ entirely black, conspicuously swollen, and bearing numerous (about 200 to 260) small, irregularly shaped and irregularly placed sensoria on the basal three-quarters; the sensoria are closely placed and

many are coalesced. Abdomen pale green, the segments posterior to the cornicles usually concolorous with thorax. Cornicles concolorous with abdomen at extreme base, the tip black, and the remainder brownish to blackish; not reaching to tip of cauda; cylindrical, the top only slightly narrower than base; the distal end reticulated. Cauda concolorous with abdomen and with a slight duskiness, the tip blackish; ensiform; very sparsely hairy; less than half the length of cornicles.

Average measurements from specimens on slides in balsam, made soon after mounting: Length of body 2.55 mm., width 1.31 mm.; length of middle tibia 1.31 mm., of hind tibia 1.75 mm., of hind tarsus 0.135 mm., of cornicle 0.80 mm., of cauda 0.35 mm. Antennal measurements as follows:

ANTENNAL SEGMENT NO. 1m.

I.	II.	III.	IV.	V.	VI. (base)	VI. filament
mm. 0.122	mm. 0.078	mm. 0.513	mm. 0.513	mm. 0.547	mm. 0.174	mm. 0.956
....	....	.748	.542	.547	.165	.939
....	....	.887	.574	....	....	....
.130	.087	.817	.565	.591	.156	....
....	....	.852	.591	.574	....	....
....	....	.869	.582	.626	....	....

Described from specimens collected at La Fayette, Ind., on crested wild buckwheat (*Polygonum cristatum*), September 4 and 6, 1911, and on curled leaf dock (*Rumex crispus*), October 13, 1911, and October 26 and November 19, 1912. We have also collected it on *Polygonum cristatum* at Lancaster, Wis., September 26, 1911, and have received it from Mr. W. J. Phillips, who collected it "from a vine in clover field" at Warsaw, Ind., August 18, 1911. Mr. J. T. Mouell also collected this species at St. Louis, Mo., October 4, 1911, on *Rumex*. The viviparous females occur on the *Polygonum*, while the males and oviparous females occur in the

fall of the year only, on *Rumex*, on which plant the eggs are laid. The details of this migration from *Polygonum* to *Rumex* have not been worked out.

Macrosiphum tiliæ (Monell).

When in Madison, Wis., the past fall (September 10, 1912) the writer found this rather rare species not uncommon on basswood (*Tilia americana*), both green and pink viviparous females, as well as the sexes, being observed. Previous to this collection, he had found this species on only two occasions—July 23, 1908, at Chicago, Ill.; only a single winged viviparous female being taken, and July 12, 1909, at the same place, only two wingless viviparous females being obtained.

Winged viviparous female. (Pl. V, figs. 21—23.)

(Described from specimens obtained at Madison, Wis.)

Green Form: Head pale brownish, eyes black. Antennæ placed on prominent tubercles as shown in illustration; black, excepting segments I and II, which are concolorous with head; reaching beyond tip of body; filament of segment VI much the longest, being about twice the length of III; segment III bearing 11 to 16 circular sensoria in a row; segments V and base of VI with the usual distal sensoria. Beak reaching just to coxæ of second pair of legs. Thorax dark green. Wings with narrow brownish veins. Media 1 and media 2 branching at about one-half the distance from where media 3-4 branches to tip of wing; this, however, not being a constant character. Abdomen pale green, immaculate. Cornicles black, reaching a little beyond tip of cauda, noticeably widened at base, and slightly constricted near tip; the tip plainly reticulated. Cauda pale green, ensiform, sparsely covered with moderately long hairs, and about one-third the length of cornicles. Anal plate rounded.

Average measurements from four specimens in balsam: Length of body, not including cauda, 2.63 mm., length including cauda 2.79 mm.; width of body 1.01 mm.; length of wing 4.10 mm.; width of wing 1.40 mm.; length of cornicle 0.88 mm., of cauda 0.28 mm. Antennal measurements as follows:

ANTENNAL SEGMENT NO. 1m.

I.	II.	III.	IV.	V.	VI. (base)	VI. filament
mm. 0.194	mm. 0.097	mm. 0.890	mm. 1.064	mm. 0.948	mm. 0.251	mm. .....
.194	097	.871	1.026	.910	.232	1.587*
.194	.097	.871	.948	.890	.232	1.548*
.194	.097	.890	1.045	.968	.232	.....
.213	.097	1.006	1.122	.968	.213	.....
.194	.097	1.006	1.142	....	....	.....
....	....	.697	.735	.755	.194	.....
....	....	.697	.774	.755	.194	1.316†

* Extreme tip broken off.
† Extreme tip is shriveled.

The *pink form* is similar to the foregoing excepting as follows: Thorax dark reddish green and abdomen decidedly pinkish. Cauda concolorous with abdomen.

Wingless viviparous female.

Described from two specimens collected at Chicago, Ill.

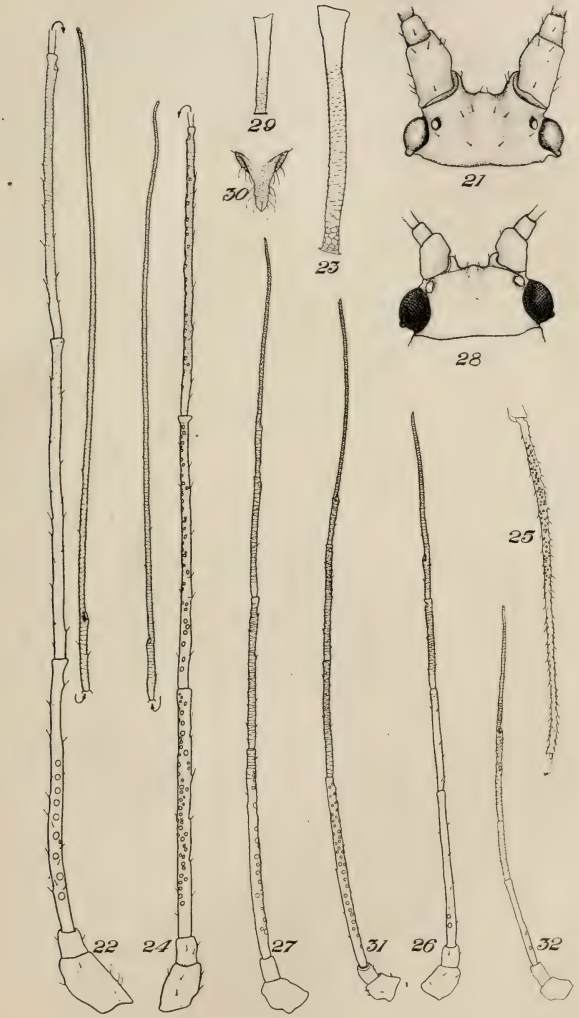
Head yellowish green. Eyes blackish. Ocelli absent. Antennæ black, excepting the two basal segments, which are concolorous with head; the filament of segment VI broken off in all specimens at hand, hence the relative length of segments can not here be given; segment III with two or three small, circular, inconspicuous sensoria near base. Legs with femora pale yellowish, excepting distal end, which is dark brown; tibiæ and tarsi dark brown to black. Abdomen pale green. Cornicles black, excepting at extreme base,where they are pale green; otherwise as in winged form. Style pale yellowish; otherwise as in winged form.

Measurements: Length of body not including style 2.44 mm., to tip of style 2.60 mm.; width 1.04 mm.; length of cornicles 2.2 mm.; of cauda 0.62 mm.

Winged male. (Pl. V, fig. 24).

Described from one specimen collected September 10, 1912, at Madison, Wis.

No colour notes made. This form differs from the winged



MACROSIPHUM TILIAE AND MYZUS LYCOPERSICI.

viviparous female as follows: It is a smaller individual. Antennæ much longer than body, relatively longer than in the viviparous form; segment III bears 60 to 70 irregularly placed circular sensoria, segment IV bears from 45 to 50, segment V with 29 to 31, not including usual distal one, more or less in a row, and segment VI bare, with the usual distal ones.

Antennal measurements as follows:

ANTENNAL SEGMENT NO. 1m.

I.	II.	III.	IV.	V.	VI. (base)	VI. filament
mm. 0.155	mm. 0.077	mm. 0.853	mm. 0.968	mm. 0.948	mm. 0.175	mm. 1.800
.155	.077	.832	.910	.968	.193	1.800

Wingless oviparous female. (Pl. V, fig. 25).

Described from one specimen collected September 10, 1912, at Madison, Wis.

Head very pale brownish. Antennæ black, excepting segments I and II, which are concolorous with head; total length greater than that of body; filament of segment VI much the longest; segment III with a single inconspicuous circular sensorium near base; the usual sensoria at tips of segments V and base of VI. Thorax and abdomen pale greenish yellow. Hind tibia swollen and bearing a large number of irregularly placed, circular sensoria. Cornicles blackish, pale at base; reaching a little beyond tip of cauda. Cauda concolorous with abdomen. Otherwise as in the wingless viviparous female.

Measurements from one specimen in balsam: Length of body not including cauda 2.17 mm.; length including cauda 2.30 mm.; width 1.006 mm.; cornicle 0.89 mm.; cauda 0.51 mm. Antennal measurements as follows:

ANTENNAL SEGMENT NO. 1m.

I.	II.	III.	IV.	V.	VI. (base)	VI. filament
mm. 0.193	mm. 0.096	mm. 0.774	mm. 0.794	mm. 0.813	mm. 0.213	mm. 1.490
.193	.096	.794	.813	.832	.213	1.432

Through the kindness of Mr. J. T. Monell the writer has had an opportunity of examining the type slide of this species—Monell No. 151. On the slide are two winged viviparous females, and the head and antennæ of one wingless viviparous female, all mounted in balsam under one cover glass. The data on these specimens follow:

Winged viviparous female: Antennæ with 12 to 15 circular sensoria in a row on segment III and the usual distal ones on V and base of VI. Cornicles reaching beyond tip of cauda, long, cylindrical, widened noticeably at base, slightly constricted near tip; the tip plainly reticulated. Wing veins narrrow, the branching media obscured. Measurements as follows: Length of body not including cauda 2.51 and 2.63 mm. respectively; length of cornicles 0.968 mm., of cauda 0.278 mm.; length of hind tibia 2.98 mm. Antennal measurements as follows:

ANTENNAL SEGMENT NO. 1m.

I.	II.	III.	IV.	V.	VI. (base)	VI. filament
mm. 0.193	mm. 0.097	mm. 0.968	mm. 1.045	mm. 0.987	mm. 0.232	mm. .....
.193	.097	.948	1.045	1.096	.232	.....
.193	.097	.948	1.084	.968	.213	1.761
....	....	.987	1.084	.968	.213	1.703*

* Shriveled at tip.

Wingless viviparous female. Segments III of the two antennæ bear 3 and 5 small circular sensoria respectively, near the base, and the usual distal sensoria on V and base of VI. Antennal measurements as follows:

ANTENNAL SEGMENT NO. 1m.

I.	II.	III.	IV.	V.	VI. (base)	VI. filament
mm. 0.193	mm. 0.097	mm. 1.064	mm. 1.026	mm. 0.968	mm. 0.232	mm. .....
.193	.097	1.064	1.045	.929	.232	1.819

NOTES ON THE WINTER AND EARLY SPRING COLEOPTERA OF FLORIDA, WITH DESCRIPTIONS OF NEW SPECIES.

BY W. S. BLATCHLEY, INDIANAPOLIS, IND.

(Continued from p. 66).

Ora hyacintha, sp. nov.

Elongate-oval, strongly depressed. Nearly uniform testaceous, feebly shining, the thorax, scutellum, front tibiæ and apex of hind femora in some specimens more or less infuscate. Head broad, finely and sparsely punctate; eyes small, coarsely granulate, separated by more than twice their own diameters; antennæ slender, half the length of body, the second joint much stouter and slightly longer than third, the two united shorter than fourth, which is subequal to those which follow. Thorax twice as wide as long, sides broadly rounded, base bisinuate; front angles rounded, hind ones obtuse, disc finely and sparsely punctate and with a small irregular impression each side of middle. Elytra conjointly one-half longer than wide, distinctly wider than thorax, margins strongly flattened and reflexed; disc widely, shallowly but obviously bisulcate, finely, sparsely and irregularly punctate. Prosternum with a very thin, blade-like process between the front coxæ; middle and front femora stout, hind ones greatly enlarged; under surface minutely and rather densely punctate, very finely pubescent. Length 5.5—6.5 mm. Width 3.5 mm.

Described from 16 specimens taken from the southeastern shore of Lake Okeechobee, March 6 and 7. They were found only in and beneath the hollow stems of decaying water hyacinth (*Piaropus crassipes* Mart.) next to the water's edge. When the stems were broken open the beetles would emerge and jump about in a grotesque manner. Supposing they were some form of Halticini, I recorded them at the time as "flat jumping Chrysomelids." From other described species of *Ora* they differ especially in the uniform dull yellow colour and more distinct sulcations of elytra.

The genus *Ora* is closely allied to *Scirtes*, differing mainly in the prosternum being prolonged in a very thin lamina between the front coxæ, and in the margins of the thorax and elytra being strongly flattened and reflexed. The hind coxæ are also separated posteriorly by an intercoxal process.

Cyphon perplexus, sp. nov.

Oblong-oval, subdepressed, rather thickly clothed with short, suberect yellowish hairs. Uniform pale brownish yellow, feebly shining; elytra each with an indistinct oblique dusky spot on basal fourth. Antennæ with five outer joints dusky, second joint stouter and slightly shorter than third, the two together equal to or slightly longer than fourth. Head finely and rather densely granulate-punctate; eyes small, widely separated. Thorax twice as wide as long, sides straight and parallel, hind margin bisinuate, front one less strongly so, all the angles distinct but obtuse; disc very finely, evenly and rather sparsely punctate. Elytra more than one-half longer than wide conjointly, one-third wider at base than thorax, sides parallel for two-thirds their length, thence gradually converging to apex; disc punctate like the thorax, the punctures somewhat coarser. Under surface very finely and rather densely punctate. Length 2—2.5 mm.; width 1.5 mm.

A common insect on the flowers of an Ericad (*Andromeda nitida* Bart.) also beaten from oak, myrtle, etc. Described from 36 specimens taken at Dunedin, January 19–March 21; Lake Istokpoga, February 25; Kissimmee River, February 19; Sanford, April 4; Eustis, April 6; Ormond, April 14.

Smaller and paler than *C. variabilis*, sides more parallel, upper surface much more finely, sparsely and evenly punctate. The second and third joints of antennæ are each distinctly shorter than the fourth, while in *variabilis* the three joints are subequal in length.

4608.—**Buprestis sulcicollis** Lec. One specimen beneath bark of dead pine. St. Petersburgh, January 20.

4617.—**Melanophila notata** Lap. & Gory. One beaten from pine. Ormond, April 6.

4658.—**Chrysobothris chrysoela** Ill. Single specimens of this small and very handsome species were beaten from oak at Lake Istokpoga, February 25; Fort Myers, March 10; Sanibel Island, February 25.

Plateros flavoscutellatus, sp. nov.

Elongate-oblong, depressed, wider behind. Black, feebly shining; thorax yellow with a large subquadrate black spot which is divided along the middle by a very narrow yellow line, this line extending back along the edges of the suture to beyond the middle

of elytra; scutellum, narrow side margins of elytra from humeri to or beyond the middle, and bases of front and middle femora, also yellow. Antennæ strongly compressed, the second joint very small, one-third the length of the third, the latter as broad at apex as long, one-half the length of fourth. Thorax subpentagonal, concave, sides straight, strongly reflexed and slightly diverging from apex to base, the hind angles acute and prolonged beyond the union of basal and side margins; disc irregular, the median line distinct only on basal half. Elytra as wide at base as thorax, feebly but distinctly widened behind the middle; alternate intervals but slightly elevated; cells small, subquadrate, males with the sixth ventral widely and deeply emarginate and the antennæ more distinctly serrate than in the female. Length 5.5—7 mm.

Described from 14 specimens taken by beating at Dunedin, March 27—April 1; Sanford, April 3; Eustis, April 6; Ormond, April 11—13.

While our species of *Plateros* are, in most collections, badly mixed and, as LeConte says, "are almost undistinguishable," this one is easily separated from all others by the colour as described, especially the yellow scutellum, and by the greatly prolonged hind angles of the thorax. According to Mr. Schwarz, to whom specimens were sent for examination, it is "a common Florida species which stands in the U. S. National Museum as *P. timidus* var.?"

4824.—**Pyractomena borealis** Rand. On the evening of Feb 19, while at our second camp, which was on an island in Kissimmee Lake, I noted a firefly or two over a damp meadow near the tent. Getting my net, I sallied forth, eager for prey. The only specimen which I was able to capture was one which, instead of flashing its light intermittently, turned it on apparently to stay and flew in a wide half circle out over the lake and back within twenty feet of where I stood. I traced its entire flight by the steady constant light. It is a male, the only specimen of its kind I took, and seems to be the same as our northern specimens of the above name. I can find no record of a firefly thus emitting a constant instead of an intermittent light. This it continued to do while in the bottle until it succumbed to the fumes of the cyanide.

Attalus zebraicus, sp. nov.

Oblong, subdepressed, distinctly dilated behind. Occiput and

major portion of thorax black, shining; front of head and a large triangular space each side of base of thorax reddish; elytra dull yellow, each with an oblique black stripe reaching from humerus to near the suture at middle, and an oblong lateral black spot on apical third; antennæ dusky, legs dull yellow, abdomen blackish. Length 2.3—2.5 mm.

Taken by sweeping at Sanford, March 29; Ormond, April 3–6. Allied to *scincetus* Say but shorter, more dilated behind and with distinct and constant colours as described. The oblique black stripe of elytra is curved outward at its posterior end and in some specimens almost touches the lateral black spot.

5170.—**Enoclerus lunatus** Spin. Four specimens from flowers of the thistle (*Carduus horridulus* Pursh.). Sarasota, February 16—March 4; Sanford, March 24.

Catorama porosum Fall. A dozen or more specimens were taken by beating oak when the trees were in blossom. Dunedin, March 21—30; Sanford, March 29; Ormond, April 13. One of the Ormond specimens is 4 mm. in length.

5325.—**Eutylistus tristriatus** Lec. One specimen beaten from Spanish moss. Dunedin, March 21.

Eutylistus fallax Fall. One taken by sweeping. Lake Istokpoga, February 23. This and the two preceding species were identified for me by Mr. H. C. Fall.

Rhipidandrus fulvomaculatus Dury (Mss.) Sixty or more specimens of this, about 30 of *Cis hirsuta* Casey, several of *Cis creberrimus* Mellie and *Ceracis sallei* Mellie were sifted from decaying woody fungi at the base of a pine. Dunedin, January 24.

5485.—**Euparia castanea** Serv. Three specimens from a nest of small brown ants, beneath the bark of a decayed oak stump. Sanford, January 16.

Aphodius campestris Bl. A third specimen was taken near Dunedin, February 11. The two types were from Sarasota.

5560.—**Aphodius concavus** Say. A single example of this large species was taken at Sanford, January 13. I cannot find that it has been before recorded from Florida.

5928.—**Cremastochilus squamulosus** Lec. One from beneath bark of pine log in company with several red and black ants. Sarasota, March 3.

6106.—**Ancylocera bicolor** Oliv. Four examples of this handsome Cerambycid were taken by beating oak when in blossom. Bassenger, February 28; Sanford, March 28; Eustis, April 6.

6134.—**Æthecerus hornii** Lac. One from flowers of the farkleberry (*Vaccinium arboreum* Marsh). Ormond, April 6.

Euryptera flavatra, sp. nov.

Elongate, slender. Head yellow, the occiput and labrum piceous; thorax yellow with a black median stripe; scutellum piceous; elytra, basal two-thirds yellow, apical third black; basal joints of antennæ and under surface black; apical half of antennæ and legs piceous, the coxæ and tibiæ paler. Eyes large, broadly and deeply emarginate on the inner border. Antennæ half the length of body, second joint very small, third twice as long as fourth. Thorax bell-shaped, flattened above, as wide at base as long, hind angles scarcely prolonged, the black median stripe finely pubescent and densely granulate-punctate, the sides densely clothed with long prostrate yellow hair. Elytra coarsely and rather densely punctate, the yellow portion with long, semi-erect yellow hairs, the black portion with similar black hairs. Side pieces of meso- and meta-sterna finely and densely punctate; abdomen minutely and very sparsely punctate. Hind coxæ contiguous. Length 7.5 mm.

One specimen swept from the flowers of the hoary lupine (*Lupinus diffusus* Nutt.) near Dunedin. March 19. Very different from all other described Lepturids by the colour. The transition from the bright yellow basal to the shining black apical portion of elytra is abrupt.

6462.—**Lypsimena fuscata** Lec. One beaten from a dead oak near Eustis, April 7.

6562.—**Lema cornuta** Fab. One swept from hoary lupine near Dunedin, March 29.

Chlamys nodulosa Bl. This species, described in the Canadian Entomologist, January, 1913, I found to be quite common at Dunedin, Lake Istokpoga and Sanford. It, therefore, probably occurs throughout Central and Southern Florida on oak, myrtle and other foliage. February 25—April 14.

(To be continued.)

A NEW SPECIES OF ORTHOPTERA, FORMING A NEW GENUS AND FAMILY.

BY E. M. WALKER, TORONTO.

While collecting on Sulphur Mountain, Banff, Alberta, on June 29th, 1913, Mr. T. B. Kurata and the writer captured two specimens of a peculiar wingless thysanuriform insect, which at once struck me as very remarkable on account of their possessing an ovipositor like that of the Tettigonidæ (Locustidæ). The two specimens, both females, are of about the same size, and, judging by the size and appearance of the ovipositor, are probably mature. They were found running about like centipedes under the stones of a talus-slope at an altitude of about 6500 feet. Considerable search was made for more specimens, but without success.

A study of these specimens shows that they are genuine Orthoptera, but of a very generalized type and cannot be placed in any of the known families of this order. Their appearance is somewhat suggestive of the termites, or, still more, of the nymphs of the Plecoptera, but that they are true Orthoptera is at once apparent, in spite of the total absence of wings, on an examination of the mouth-parts, the cervical and thoracic sclerites and the ovipositor.

This insect forms the type species of a new genus, *Grylloblatta*, and a new family, *Grylloblattidæ*.

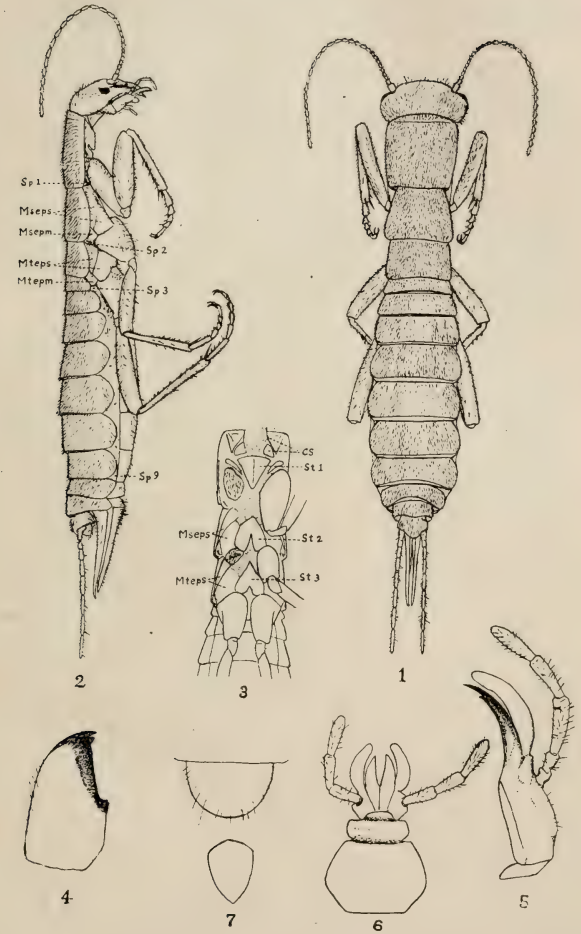
Grylloblattidæ, new family, and **Grylloblatta,** new genus.

Body elongate, slender, depressed, thysanuriform; head blattoid, somewhat flattened, obliquely attached to the prothorax; epicranial suture distinct; antennæ arising close to the fronto-clypeal suture, shorter than the body, with 26 to 29 segments; eyes small, widely separate; ocelli absent; labium with glossæ and paraglossæ separate and well differentiated. Thoracic nota flattened, quadrate, decreasing in size caudad; meso- and meta-episterna well developed, oblique, each with a horizontal fold, apparently dividing it into two parts; epimera small; sternal plates small, separated by considerable areas of soft cuticle; thoracic stigmata two, the first close to the hind margin of the prothorax, the second upon the mesepimeron. Legs cursorial; coxæ large, especially the first pair; femora, tibiæ and tarsi with a few slender scattered spines, tibial spurs two, an outer

and inner, the latter the larger; tarsi 5-jointed, without pulvilli. Abdomen with 10 segments; tergites not overlapping the sternites, separated by a well-developed pleural membrane; abdominal stigmata on the pleural membrane of segments 1–7, very minute and difficult to see; cerci about as long as the hind tibiæ, slender, cylindrical, 8-jointed; ovipositor exserted, composed of 3 pairs of elongated processes or valves, the upper pair slightly longer, the middle pair slightly shorter than the lower pair; inner valves exposed in lateral view, each valve fitting into a groove on the corresponding valve of the lower pair, but not connected with the upper pair.

Grylloblatta campodeiformis, n. sp.

Body uniform honey-yellow, covered with minute pubescence. Head flattened, rounded, nearly as broad as long, broadest across the eyes, which are ovo-triangular, about as broad as long and distant from the lateral margin by a little less than their transverse diameter; facets about 70, slightly irregular in size and arrangement; antennæ reaching back to about the hind margin of the metathorax, filiform, very slightly tapering; first segment somewhat flattened, about two-thirds as wide as the eye and as long as segs. 2–3, which are together equal to segs. 4,5 and 6, distad of which the segments gradually increase in length to about seg. 16, shortening again slightly towards the apices; clypeus as broad as the space between the middle of the basal joints of the antennæ and somewhat more than twice as broad as long, lower margin nearly straight; labrum semi-ovate, the free margin regularly convexly curved; mandibles with a basal, apical and subapical tooth (maxillæ and labium, see pl. VI, figs. 5, 6). Pronotum transversely feebly convex, slightly longer than broad, anterior margin gently arcuate, posterior margin nearly straight and subparallel, antero-lateral angles slightly rounded, postero-lateral angles rectangulate; a straight transverse groove just behind the anterior margin. Mesonotum scarcely three-fourths as long as the pronotum, somewhat constricted at base, expanding slightly caudad, the straight posterior margin somewhat greater than the length, the lateral margins deflected, arcuate in lateral view; postero-lateral angles well rounded. Metanotum almost four-fifths as long as the mesonotum, somewhat less than twice as broad as long, feebly expanding



GRYLLOBLATTA CAMPODEIFORMIS, n. gen et. sp.

caudad; lateral margins and postero-lateral angles as in the mesonotum. Prosternal plate triangular, mesosternal and metasternal plates somewhat V-shaped, all separated by considerable areas of soft integument, which is covered by the large coxæ. Front coxæ stout, slightly shorter than the pronotum and longer than the middle and hind coxæ, the middle pair being the shortest; each coxa with a distinct ridge separating the ventro-anterior and postero-lateral surfaces. Fore and middle femora and tibiæ all of nearly the same length, each being about as long as the pronotum; front tarsi slightly shorter, middle tarsi slightly longer than the corresponding tibiæ; hind femora, tibiæ and tarsi of nearly the same length, distinctly longer than the corresponding parts of the other two pairs of legs. Abdomen widening from base to segment 5, which is slightly wider than the head, narrowing again rapidly in the last 3 segments. Cerci with 8 cylindrical segments, which gradually lengthen distad. Ovipositor slightly shorter than the hind femora, somewhat compressed, in profile tapering rapidly from the base, the basal depth being about one-third of the length; upper valves nearly straight, lower and inner valves distally upcurved, apices of all acute.

MEASUREMENTS (lengths in millimetres).

	Body ex. ov.	Ant-enn.	1st fem.	1st tib.	1st tar.	2nd fem.	2nd tib.	2nd tar.	3rd fem.	3rd tib.	3rd tar.	Ovip.
Type	30	8.5	2.8	2.25	2.6	2.5	2.5	2.75	3.4	3.6	3.4	3.0
Cotype	30	9.0	2.6	2.25	2.6	2.5	2.3	3.0	3.2	3.5	3.4	3.3

Type ♀ and cotype ♀: Sulphur Mt., Banff, Alta., 6590 ft., June 29th, 1913, in the collection of the University of Toronto.

The family Grylloblattidæ differs from all the other families of non-saltatorial Orthoptera in the possession of a large exserted ovipositor of the Tettigonid type. Among other differential characters possessed by these families are the following:

In the Hemimeridæ the tarsi are 3-jointed, the coxæ small and widely separated, the cerci unjointed, and the abdominal sternites are overlapped by the tergites.

In the Blattidæ, the general form of the body is much broader, the head is scarcely visible from above and is much narrower than the pronotum, which is usually broader than long; the antennæ are longer than the head and thorax, setaceous and generally consist of

a larger number of small segments; the cerci are flattened and distally tapering.

In the Mantidæ, the eyes are larger and much more prominent, the antennæ setaceous, the front legs raptatorial and the front femora nearly always spinose along the outer edge; the prothorax is usually elongated and the cerci are much shorter than the hind femora.

In the Phasmidæ the prothorax is smaller than the mesothorax, the meso- and metathorax are both greatly elongated, the coxæ small and short, pulvilli are present and the cerci are unsegmented and shorter than the hind femora.

From the families of saltatorial Orthoptera the Grylloblattidæ differ in the generalized structure of the hind legs, the five-jointed tarsi and the jointed cerci.

Grylloblatta is thus seen to combine characters possessed by several different Orthopterous families, but to be amply distinct from all of them. On the whole, it appears to be most nearly related to the Blattidæ, though the general form of the body is most like that of the Forficulidæ. It resembles the Blattidæ very closely in the form of the head, the depressed body and cursorial legs, but the form of the body is less specialized and the peculiarities of the blattid leg, such as the greatly enlarged and closely approximated coxæ with the correlated reduction of the sternal plates, though present in Grylloblatta, are much less marked than in the cockroaches. The scattered tibial spines and five-jointed tarsi are also characters that are common to both families. The simple antenniform cerci recall those of *Campodea*, and are probably of a more primitive type than the short flattened cerci of the Blattids.

The position of the base of the antennæ close to the fronto-clypeal margin is another primitive character in which *Grylloblatta* resembles the Plecoptera.

On the other hand, *Grylloblatta* appears to be more specialized than the Blattidæ in the absence of styli and the presence of the Tettigonid type of ovipositor. Apart from these latter features this genus is distinctly more primitive than any of the other families of Orthoptera, as far as external features are concerned.

Of the three families of saltatorial Orthoptera, *Grylloblatta* is most like the Gryllidæ in the depressed form of the body and shape

of the head, but resembles the Tettigonidæ much more closely in the structure of the ovipositor the inner valves of which, as in this family, are nearly as long as the other two pairs. The antennæ, however, in length and in number, size and form of the segments are most like those of the Locustidæ (Acrididæ).

The presence of the Tettigonid type of ovipositor in so primitive a form as *Grylloblatta* seems to indicate that this type of ovipositor was present in the earliest saltatorial Orthoptera and that the Tettigonidæ are therefore, in this respect, the most primitive of the modern saltatorial families.

If this conclusion is not accepted, then one at least of the following assumptions must be made:

(a) That *Grylloblatta* is a degenerate descendant of saltatorial forms, which, like the mole-cricket, has secondarily lost its power of leaping.

(b) That the adaptations for leaping have been independently acquired in the Tettigonidæ on the one hand, and the other families of saltatorial Orthoptera on the other, i.e., *Grylloblatta* and the Tettigonidæ represent a distinct line of descent from those which have culminated in the Gryllidæ and Locustidæ.

(c) That the resemblance between the ovipositors of the Tettigonidæ and *Grylloblatta* is due to convergence.

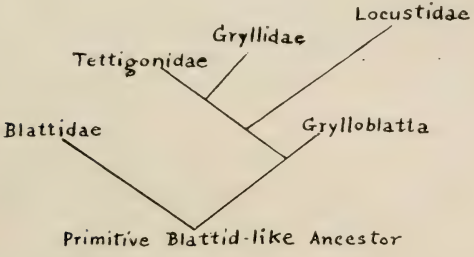
The first assumption is clearly untenable on account of the evident relationship between the Grylloblattidæ and the other non-saltatorial Orthoptera, particularly the Blattidæ, with which they share the 5-jointed tarsi and jointed cerci, both of these being primitive characters not present in any of the saltatorial Orthoptera.

The second assumption is equally inadmissible, as the families of saltatorial Orthoptera form a decidedly natural group, the Gryllidæ and Tettigonidæ being particularly closely allied to one another.

The third assumption is less improbable, but the resemblance between the ovipositors of *Grylloblatta* and the Tettigonidæ is very close, and it seems more natural to regard them as truly related in this respect.

I am thus inclined to regard the ovipositor of *Grylloblatta* as nearly representing that of the common ancestor of the three families of saltatorial Orthoptera, the Tettigonidæ having departed least from the original type as regards this structure. *Grylloblatta* has been derived from some primitive type of Blattid or Blattid-like ancestor.

These relationships are expressed graphically in the accompanying diagram.



EXPLANATION OF PLATE VI.

Fig. 1. *Grylloblatta campodeiformis*, ♀ type, dorsal view.

Fig. 2. Same, lateral view.

Fig. 3. Same, ventral view of thorax and base of abdomen (front and middle legs of right side removed).

Fig. 4. Same, mandible.

Fig. 5. Same, maxilla.

Fig. 6. Same, labium.

Fig. 7. Same, labium (above), hypopharynx (below).

Sp.1, Sp.2, Sp.3, Sp.9, Spiracles; Mseps mesepisternum; Msepm, mesepimeron; mteps, metepisternum, mtepm, metepimeron, C. S., cervical sclerites; St1, St2, St3, pro-, meso- and metasterna.

ANOTHER MIGRATION OF *ANOSIA PLEXIPPUS* FAB.

In the Canadian Entomologist, Vol. XLIV, pp. 366-367, 1912, the writer gave some observations on the autumn migratory bands of this butterfly witnessed by him in various parts of the country.

On October 28 and 29, 1913, these insects were present in myriads clinging to the limbs of trees about Fort Moultrie, on Sullivan's Island, near Charleston, S. C. The weather was cool for the latitude, but the butterflies did not seem to pay any attention to the temperature, winging their way about in the sunshine as is their habit farther north, finally drifting away. Judging from the numbers observed dead and cast up on the beach by the sea, not all of the migrants passed onward in safety. As usual, there were numerous individuals flying about after the migrating band had passed onward.

F. M. Webster.

PROHIBITION OF THE IMPORTATION OF NURSERY STOCK INTO CANADA BY MAIL.

By an order in Council of December 4th, 1913, the Regulations under "The Destructive Insect and Pest Act" were amended as follows:

In Regulation 3, line 14, the words "Importations by mail shall be subject to the same Regulations" have been struck out and the following New Regulation, No. 18, has been passed:

> "18. The importation of all nursery stock, including trees, shrubs, plants, vines, grafts, scions, cuttings, or buds, through the mails is prohibited, excepting greenhouse-grown florists' stock, cut flowers, herbaceous perennials, and bedding plants, which will be admitted provided that a detailed statement of the contents is attached to such parcels."

This Regulation will take effect on and after the first day of March, 1914.

C. Gordon Hewitt,
Dominion Entomologist.

Department of Agriculture,
Ottawa, Ont.,
December 10th, 1913.

THREE DIPTERA FROM THE MIOCENE OF COLORADO.

BY T. D. A. COCKERELL, UNIVERSITY OF COLORADO, BOULDER.

Atrichops hesperius, n. sp. (Leptidæ).

Length 6 mm., wing 5 mm.; robust, of the usual form; tarsi microscopically hairy, not at all bristly or spiny; wings clear or almost, the venation as preserved pale reddish. Venation as in *Atrichops crassipes* (Meigen), except as follows: Auxiliary vein reaching costa distinctly before middle of wing; end of subcostal cell larger; base of second posterior cell more oblique; anal cell not so broad. The anal cell is closed a short distance before the wing-margin. The long second submarginal cell has its lower side measuring about 2560 microns. The anterior cross-vein is about 290 microns from basal corner of discal cell. Florissant; Station B 13 (*S. A. Rohwer*).

The shape of the wings and the details of the venation place this species in *Atrichops* Verrall, rather than in *Atherix*. *Atrichops* has hitherto contained a single living Palæarctic species, so it is interesting to find it in the Miocene of America. It is less pubescent than *Atherix* (and in this the fossil also agrees) and the venation is on the whole less specialized.

Xylomyia moratula, n. sp. (Leptidæ).

Length 6 mm., wing about 5½; of the usual form; head and thorax black, abdomen light reddish; legs reddish brown; tibiæ and tarsi not at all spinose or bristly; wings hyaline; venation as preserved light reddish. Venation like that of *X. maculata* (Meigen) with the same wide open second submarginal cell and arched upper side of second posterior cell, though the latter feature is not quite so extreme as in *X. maculata*. The anterior cross-vein is near to the base of the discal cell as in *X. maculata*; the closer fourth posterior cell is relatively narrow apically as in *X. marginata* (Meigen), but its side on the third posterior, though long, is shorter than its side on the discal cell, the reverse being true of *marginata*. The insect is therefore entirely of the type of *X. maculata*, as opposed to that of *X. marginata*, which is perhaps hardly congeneric.

The following wing measurements are in microns: Length of lower side of second submarginal cell about 1695; base of second submarginal to anterior cross-vein about 1570; level of end of upper

side of second submarginal basad of level of end of lower side, 400, and width of cell at this point 530; width of second submarginal 640 from end of lower side, 432; width of first posterior cell at apex 640, of second at apex 320, of third at apex 1250; discal cell on first posterior 960, on first basal 225; basal side of second posterior 160, of third posterior 272; closed apex of fourth posterior to wing margin about 240, of anal to wing margin apparently over 320, but margin at this point not visible; width of anal at level of basal corner of fifth posterior 480. Florissant; Station 13 (*S. A. Rohwer.*)

This genus has been referred by Osten-Sacken, Verrall and others to the Stratiomyidæ, but Williston places it in Leptidæ. The genera *Arthropeas* and *Arthropiella*, which Meunier places in a distinct family, are apparently related; they occur in Baltic amber. Verrall states that the larva of *Xylomyia* shows that it belongs with the Stratiomyidæ rather than with the Leptidæ. On the whole, it seems probable that *Xylomyia*, *Glutops*, *Arthroceras*, and probably the two amber genera, should together form a distinct family.

Saropogon oblitescens, n. sp. (Asilidæ).

Wing about 7½ mm. long; fourth posterior and anal cells closed; small cross-vein from base of second submarginal cell 1040 microns, but second submarginal cell over 1440 long (apex gone); second submarginal cell, so far as visible, narrow, parallel-sided, its width (depth) about 290 microns; small cross-vein 1230 microns from base of discal cell, and 800 from its apex; separation of second and third veins 1230 microns from origin of their common stem from first; fourth posterior cell closed about 130 microns from margin, anal the same distance, but apex of anal a much smaller angle than apex of fourth posterior; apical sides of discal cell very unequal, that on second posterior cell twice as long as that on third; apical angle of discal cell very much greater than a right angle. Wing clear, venation dark brown. Compared with *Saropogon dispar*, the fossil differs in having the fourth posterior and anal cells closed well before the margin, and the second posterior distinctly narrower, but otherwise the venation is about the same. The venation is in general very like that of *Selidopogon diadema*, but that has the second posterior cell more widely open, and the subcostal cell larger. Florissant (University of Colorado Expedition).

NEW GENERA AND SPECIES OF TENTHREDINIDÆ: A FAMILY OF HYMENOPTERA.*

BY ALEX. D. MACGILLIVRAY, UNIVERSITY OF ILLINOIS, URBANA, ILL.

The following descriptions of new genera and species are a continuation of those of a previous paper:

Empria costata, n. sp.—Female: Body black with the collar, tegulæ, the legs beyond the knees for the most part, and the caudal margin of the abdominal segments, white; head with the post-ocellar area uniformly convex, the interocellar and ocellar furrows distinct; the clypeus tridentate, the median tooth as long as the lateral angles, broadly, shallowly emarginate at middle, the lateral angles rounded, the median ridge low, not reaching the dorsal margin of the clypeus; the third segment of the antennæ longer than the fourth; the sawguides slightly convex above, broadly, convexly rounded below at apex to a blunt point above, wings hyaline. Length 6 mm.

Habitat.—New Haven, Connecticut. B. H. Walden, collector.

This species falls near *cava*, from which it differs in lacking the broad, convexly rounded median ridge of the clypeus and from *calda* in having the clypeus tridentate with the median tooth as long as the lateral angles.

Pseudoselandria, n. gen.—Front wings with the radial cross-vein, the media-cubital cross-vein, the free part of R_5, and the free part of R^1 present; the free part of the second anal vein wanting; media not strongly angularly bent, the first abscissa of cubitus distinctly longer than the free part of M_4; costa dilated at apex; hind wings with the first anal cell distinctly petiolate and shorter than the cell in front of it; media separating from radius distinctly before the origin of the radial sector; claws with a minute erect tooth at base; antennæ with nine segments. Type *Pseudoselandria oxalata*, n. sp.

Related to the genus *Selandria*, from which it differs in that the claws have an erect tooth at middle and the media is not angularly bent at base.

* Contributions from the Entomological Laboratories of the University of Illinois, No. 37.

March, 1914.

Pseudoselandria oxalata, n. sp.—Female: Body black with the following parts whitish; the two basal segments of the antennæ, the labrum, the clypeus, the collar broadly, the tegulæ, the upper half or more of the pleuræ, the legs, the wings at base, and the abdomen except the saw-guides; median fovea deep, ovate, transverse; ocellar basin distinct; third segment of the antennæ as long as four and five together; wings clear with the apex of radius strongly dilated and black. Length 7 mm.

Habitat.—Wisconsin. Dr. S. Grænicher, collector.

Polyselandria, n. gen.—Front wings with the radial cross-vein, the medio-cubital cross-vein, the free part of R_5, and the free part of R_4, present; media not strongly, angularly bent; the first abscissa of cubitus distinctly longer than the free part of M_4; costa dilated at apex; hind wings with the first anal cell closed at the wing margin and longer than the cell in front of it; media coalesced with the radial sector for a short distance; claws with a minute erect tooth at base; antennæ with nine segments. Type, *Selandria floridana* MacG.

Closely related to *Pseudoselandria*, from which it differs in having the first anal cell of the hind wings closed at the wing margin and in having media of the front wings coalesced with radius for a short distance.

Dolerus tectus, n. sp.—Female: Body black; antennæ with the third segment slightly longer than the fourth; head with the vertical furrows obsolete, the front and vertex uniformly convex, the entire surface punctured, the postocellar area more densely and finely punctured than the posterior orbits, the posterior orbits without ridges or depressions, the antennal furrows indicated only near the antennal sockets; the scutellar appendage smooth, without punctures or striations; the median lobe of the mesonotum and the scutellum more closely punctured than the disk of the lateral lobes, the disk of the lateral lobes almost polished; the pleura closely, coarsely punctured; the impunctate area of the lateral lobes of the mesonotum extending to the median lobe; the wings fuliginous, the veins and stigma black. Length 10 mm.

Habitat.—New Haven, Connecticut. H. L. Viereck, collector.

A black species related to *polysericeus*, from which it differs in having the punctures on the scutellum similar in size to those of the lateral lobes of the mesonotum and from *colosericeus* and *monosericeus* in having the vertical furrows obsolete.

Dolerus inspiratus, n. sp.—Female: Body black with the entire prothorax, the tegulæ, the median lobe of the mesonotum, the front legs below the knees, and abdominal segments one to six, rufous; head with a concave furrow from the vertical furrows to the lateral margin of the head behind the compound eyes, a distinct carina between the posterior orbits and the caudal aspect of the head; the postocellar area more closely and finely punctured than the posterior orbits: the posterior orbits with an impunctate area adjacent to the vertical furrows; the vertical furrows punctiform; the antennal furrows not indicated except adjacent to the antennal sockets; the scutellar appendage longitudinally striate; the impunctate area of the lateral lobes of the mesonotum not extending to the median lobe; the median and lateral lobes uniformly punctured, the punctures distant; the scutellum uniformly, closely punctured; the saw-guides slightly exserted, straight above, convex below, and convexly truncated to a point at apex above. Length 9 mm.

Habitat.—New Haven, Connecticut; A.B. Champlin, collector. Eagle Bend, Minnesota; J. P. Jensen, collector.

This species is related to *conjugatus* and *dysporus*, from both of which it differs in the arrangement of the punctuation of the posterior orbits and the postocellar area and also by the transverse brownish band on the prothorax and mesothorax.

Dolerus lesticus, n. sp. Female and male: Body black with the entire prothorax, the dorsal and lateral portions of the mesopleuræ, and the median lobe of the mesonotum, rufous; the third segment of the antennæ subequal in length to the fourth; the vertex and the front uniformly and generally punctured; the antennal furrows slightly indicated adjacent to the antennal sockets; the vertex without furrows or carinæ; the vertical furrows distinct,

twice as long as broad; the median lobe of the mesonotum and the scutellum uniformly, sparsely punctured; the lateral lobes of the mesonotum uniformly, sparsely punctured, their disk almost smooth; the mesopleura uniformly, coarsely, closely punctured; the saw-guides convex above and below, the two margins converging and obliquely truncated at apex above, the apex with a sparse scopa of long hairs; the wings slightly infuscated, the veins and the stigma brownish; the male differs in having the body entirely black and the ridge between the vertex and the caudal aspect of the head slightly carinated. Length 6 mm.

Habitat.—Durham, New Hampshire; Weed and Fiske, collectors. Hampton, New Hampshire; S. A. Shaw, collector.

A small species related to *collaris*, from which it differs in having the antennal furrows extending only a short distance from the antennal sockets.

Dolerus konowi, n. sp.—Female and male: Body entirely coal-black; antennæ with the third segment slightly longer than the fourth; the vertical furrows indicated only as a broad depression; the vertex with a shallow depression extending from the lateral ocelli behind the compound eyes; the front, the posterior orbits, and the postocellar area uniformly punctured, the punctures fine and close together; the vertex with an impunctate area adjacent to the vertical furrows; the antennal furrow faintly indicated adjacent to the antennal sockets; the appendage of the scutellum finely, transversely striated; the dorsal surface of the mesothorax finely, closely punctured except the disk of the lateral lobes, which contains a few distant punctures; the mesopleura closely and coarsely punctured; the pectus uniformly, finely punctured, not so densely as the head or notum; the body, except the abdomen, covered with short, white pile; the saw-guides straight above and gradually, convexly, obliquely rounded below and at apex to a point above; the saw-guides sparsely hairy below and at apex and densely above; wings infuscated, the veins and stigma brown; the male differs only in being smaller. Length 11 mm.

Habitat.—Olympia, Washington; Trevor Kincaid, collector.

This is a black species, which has been generally confused with the eastern *Dolerus sericeus* Say, which does not occur so far as my experience goes, upon the Pacific Coast. *Konowi* is readily differentiated from *sericeus* by the striations on the scutellar appendage. The difference between this species and *sericeus* was first pointed out to me several years ago by the late Pastor F. R. W. Konow, the German student of the Tenthredinoidea, for whom it is named.

Dolerus grænicheri, n. sp.—Female : Body black with the entire prothorax, the median lobe of the mesonotum, beneath the front wings, and the base of the front wings, rufous; the tegulæ black; the antennal furrows hardly indicated adjacent to the antennæ; the vertical furrows short, knife-like cuts; an indefinite furrow from the lateral ocelli to the corner of the compound eyes; no carina on the caudal margin of the head; the punctuation on the postocellar area and the posterior orbits dense and uniform; the scutellar appendage transversely striate; the impunctate area of the lateral lobes of the mesonotum distinct and extending to the median lobes; the scutellum more densely punctured than the median or lateral lobes, the median lobe more densely than the lateral lobes; the saw-guides straight above, convexly rounded below and at the apex to a point above, apex with a dense scopa of long hairs; the wings slightly infuscated, the veins and stigma brownish. Length 7 mm.

Habitat.—Layton Park, Milwaukee County, Wisconsin.

This species is named for its collector, Dr. S. Grænicher, who sent it to me. It is related to *unicolor*, *collaris*, and *lesticus*, from the first it differs in the type of punctuation found upon the head, from the second in the extent of the antennal furrows, and from the third in the shape of the saw-guides.

Astochus, n. gen.—Front wings with the radial cross-vein, the radio-medial cross-vein, the free part of R_4 and R_5 all present; the medio-cubital cross-vein joined to R+M a considerable distance before the origin of M; the free part of Sc_1 faint, located opposite the medio-cubital cross-vein; the free part of the second anal vein short, erect, transverse; the contraction of the third anal vein in-

dicated by an elongate thickening; hind wings with the free part of R_4 present and the transverse part of M_2 wanting; antennæ with nine segments; the clypeus truncate; the compound eyes with their inner margins parallel and distant, the basal plates divided. Type, *Astochus fletcheri*, n. sp.

The broad space between the compound eyes, the margined antennal sockets, the divided basal plates, and the truncate clypeus places this genus near *Bivena* MacG.

The two species described herewith can be differentiated as follows:

Postocellar area longer than broad.....*fletcheri*
Postocellar area broader than long.....*aldrichi*

Astochus fletcheri, n. sp.—Female: Body black with the antennæ somewhat infuscated, the legs below the trochanters, the abdomen beyond the basal plates, and the wings at base, rufous; the following parts: the clypeus, the labrum, a short, narrow line on the inner orbits, the margin of the pronotum, the tegulæ, a round spot on the mesopleura, two spots above the posterior coxæ, the underside of the front and middle coxæ, the underside and the lateral aspect of the hind coxæ, and the stigma, yellowish-white; the third segment of the antennæ longer than the fourth; the labrum broadly rounded; the ocellar basin an elevated, flat, shield-shaped space; the frontal furrow short, broad, and deep, with the lateral walls high; the postocellar area longer than broad with a median furrow, deeper behind; the head and thorax polished; the wings infuscated behind the stigma; the saw-guides convex above and below, the sides gradually converging, squarely truncated at apex. Length, 10 mm.

Habitat.—Kaslo, British Columbia.

This insect was collected by the late Dr. James Fletcher on the 28th of May, 1906, and by him sent to Dr. J. Chester Bradley for identification and by Dr. Bradley given to me. It is fitting that it should bear Dr. Fletcher's name.

(To be continued.)

A PROTECTED BUTTERFLY.

We are accustomed to reading about certain species being *protected* from their enemies by nature owing to a resemblance to other insects that are distasteful; but *Parnassius apollo* now enjoys the unique distinction of being the only insect in the world whose life is guarded against his most ruthless destroyer—man. According to an interesting item in the Entomologist (London) for October, 1913, Vol. XLVI, p. 289, the capture of this butterfly has been forbidden throughout the German Empire by order of the Government. Owing to overcollecting, the species is said to have been exterminated in the mountains of Silesia and its existence is threatened elsewhere. It is not stated how long the close season is to last, but is to be hoped that in the meantime the market price will not be increased enough to warrant wholesale poaching, and that the men who secured the legislation will be rewarded by seeing this beautiful butterfly again brightening up the landscape it formerly had a place in.

A. F. Winn.

BOOK REVIEWS.

A Revision of the Ants of the Genus Formica (Linné) Mayr. By William Morton Wheeler.—Bull. Mus. Comp. Zool. Harvard College. Vol. LIII, No. 10. Published Oct. 1913. 186 pages.

This revision of the boreal genus *Formica* by the eminent ant specialist, Dr. W. M. Wheeler, is sure to receive a hearty welcome. In it the author gives extensive descriptions of, and notes upon, all the known New World forms, now numbering 93, several of which are new, consisting of 31 species, 19 subspecies and 43 varieties, and brief descriptions of, and notes upon, the 53 Old World forms.

Seven groups are recognized.—(1) The Sanguinea group, containing thirteen forms of the palearctic and nearctic slave-maker, *sanguinea*, and six other species; (2) The Rufa group, containing eleven forms of the palearctic and nearctic *rufa* (all the nearctic

forms are western), twelve forms of the palearctic and nearctic *truncicola*, and nine other species; (3) the Microgyna group, consisting of seven forms of the nearctic *microgyna*, and six other species; (4) The Exsecta group, comprising four forms of the nearctic *exsectoides*, seven forms of the palearctic and nearctic *exsecta*, and two other species; (5) The Fusca group, including fourteen forms of *fusca*, the typical form of which is widely distributed throughout north and central Eurasia and boreal America, seven forms of the palearctic and nearctic *rufilabris*, nine forms of the palearctic and nearctic *cinerea*, and six other species; (6) The subgenus *Proformica*, including five forms of the nearctic *neogagates* and eight other species, some of them palearctic; (7) A new subgenus, *Neoformica*, erected to include the nearctic *pallidefulva* in its seven forms, and one other species, *F. moki* Wheeler.

Dr. Wheeler believes that North America must be the original home of the genus, because it has nearly double the number of species that Eurasia contains, "especially as it possesses representatives of the Eurasian groups of species besides two peculiar to itself (the Microgyna group and the subgenus *Neoformica*). Further, he regards the southern ranges of the Rocky Mountains in the United States as the centre of origin of the genus, for "nearly forty-two per cent. of the New World forms occur in Colorado and the adjacent portions of New Mexico," and the colonies of the individual forms are unusually numerous and flourishing on the mountain slopes of this territory.

Dr. Wheeler modestly makes only short references to the important discovery, in which he took a leading part, that many species, including *rufa* and *exsectoides*, form their colonies by temporary social parasitism in small colonies of *F. fusca* or in a few cases, another species. "The recently fecundated *rufa* female finds a home in a *F. fusca* colony and permits these ants to bring up her young. The *fusca* queen is either destroyed by the intrusive *rufa* or by her own offspring, so that when the *fusca* workers eventually die off a pure colony of *rufa* remains."

F. W. L. S.

ANIMAL COMMUNITIES IN TEMPERATE NORTH AMERICA, as illustrated in the Chicago Region. By Victor E. Shelford, Instructor in Zoology in the University of Chicago. The University of Chicago Press. 380 pages. 8vo. cloth, $3.22, postpaid.

Until the beginning of the present century the study of animal ecology can scarcely be regarded as having been an organized science, and, although much has since been written upon the subject, most of the literature deals with problems of a more or less specialized character, or with particular groups of forms or types of locality.

The present work is of an unusually broad scope, treating, as it does, practically all the important types of animal communities represented in the Chicago district, the total area investigated being somewhat more than 10,700 square miles. It is a work of great interest and importance to the entomologist, as well as the student of general ecology, as insects play a dominant part in practically all of the land and fresh-water animal communities.

The first four chapters form an introduction to the study of animal ecology in general and to that of animal communities in particular. Chapter I deals with the general subject of the struggle in nature, the effect of man's relation to nature and the production of secondary or man-made communities, as distinct from primary or primeval communities. In Chapter II the general subject of ecology is discussed. The author emphasizes the "inadvisability of attempting to organize ecology on the basis of structure, as structural changes resulting from stimulation by environment are rarely of advantage or disadvantage to the animal, and the structure of motile organisms is not readily modified by the environment." It is the activities of animals that form the basis for the organization of ecology, not the mosphological characters of the species, which are ecologically of little or no significance. The subject of animal communities and biota is also discussed at some length and a classification of communities is given. The chapter concludes with a classified list of the chief animal communities of the area investigated.

In Chapter III an analysis is given of the factors that enter into the composition of the animal environment. This includes a

short account of the physiographic history of the region about Lake Michigan and a description of the climate and vegetation of the area. A descriptive list of the localities studied is also given. Chapter IV treats of the conditions of existence of aquatic animals, both chemical and physical.

The special discussion of the various animal communities occupies the remainder of the book, except the last chapter. As the Chicago area lies on the borderland between the eastern forest region and the savanna or prairie region, a great variety of terrestrial communities are represented. Its position on Lake Michigan also gives variety to the aquatic conditions, practically all types of fresh-water communities being found within the area studied.

Much attention is given to the origin and development of each community and its subsequent fate, to the physiographic conditions of the environment, and the interrelations of the various forms which make up the community. At the end of last chapter are useful reference lists of the species of animals collected at the various stations representing the particular type of community discussed.

In the concluding chapter the author returns to the general subject matter and discusses suggestively the laws governing distribution, the relations of different communities to one another, and the relations of ecology to broader geographic problems. An appendix follows in which the general methods employed in the study of environment are described and brief directions given for the making of field observations and experiments. There is also a copious bibliography and a guide map of the Chicago district, and the numerous illustrations, which are of almost uniform excellence, represent a large number of the animals referred to as well as their habitats.

ERRATA.

"Green Lanes and Byways," No. 11, Vol. XLV.—On page 358, in line 10, for "Cortiani" read Coritani. In line 13—For "roads" read road. On page 363—In line 8 for "there" read then.

Mailed March 13th, 1914.

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A SYNOPSIS OF THE GENERA IN CHLOROPIDÆ, FOR NORTH AMERICA.

J. R. MALLOCH, URBANA, ILLINOIS.

Having had occasion recently to identify species of North America Chloropidæ, I found some difficulty in placing the specimens in their proper genera by the use of the published keys to the family. The most recent paper on the Chloropidæ is that by Becker,* which is a rather unsatisfactory one, lacking in many details, though it purports to be a "monographic" treatise. About a dozen North American species are left out of the paper, and the table of genera in the Chloropinæ is so framed that it is not possible to locate specimens generically. I do not purpose criticising Becker's work, believing that criticism alone is seldom beneficial, and offer the following table, which I hope will prove useful to the extent of satisfactorily locating specimens in the genera to which they belong.

I have to thank Dr. S. A. Forbes for permission to publish this paper

Generic Synopsis:

1. Costa reaching to third vein or slightly beyond it.....2
   Costa reaching distinctly to fourth vein.....13
2. Outer cross-vein absent.....*Elliponeura* Loew.
   Outer cross-vein present.....3
3. Hind femur much thickened, hind tibia bent.....4
   Hind femur not thickened; hind tibia straight, or almost so...5
4. Third joint of antennæ much elongated, about four times as long as broad; veins 2 and 3 but slightly bent forward.....*Neodiplotoxa*, n. gen.
   Third joint of antennæ but little longer than broad; veins 2 and 3 much bent forward.....*Meromyza* Meigen.

*Ann. Nat. Mus. Hung., 1912.

5. Mid tibia with the apical spur strong and distinctly bent; male hypopygium large, knob-like, curved back beneath abdomen ..... *Cetema* Hendel.

   Mid tibial spur short and straight; male hypopygium not conspicuous 6

6. Scutellum flattened on disk, with a distinct marginal rim, the apical scutellar bristles closely approximated; both sexes with an elongated oval, flattened surface (sensory organ) on hind tibia (postero-dorsal surface) ..... *Chloropisca* Loew.

   Scutellum convex, not margined, apical bristles not approximated 7

7. Sensory organ present on hind tibia, as in *Chloropisca* ..... *Pseudochlorops*, n. gen.

   Sensory organ absent from hind tibia 8

8. Head very distinctly produced in front; ocellar triangle very broad at vertex, carried forward to above antennæ in a broad prolongation, the centre convex, the sides of frons more or less excavated; third joint of antennæ distinctly longer than broad; arista generally appearing flattened through the presence of thick pubescence ..... *Ectecephala* Macquart.

   Head only slightly, or not at all, produced in front; frontal triangle triangular, or subtriangular, flat; sides of frons more or less excavated 9

9. Cross-veins strongly approximated; veins 2 and 3 bent forward ..... *Diplotoxa* Loew.

   Cross-veins not approximated; veins 2 and 3 almost straight 10

10. Third antennal joint disc-like; head not produced anteriorly; mesonotum yellow, with black or red stripes, seldom black, and indistinctly punctured or unpunctured ..... *Chlorops* Meigen.

    Third antennal joint longer than broad, head at least slightly produced anteriorly; or mesonotum black and strongly punctured 11

11. Mesonotum entirely black, coarsely punctured ..... *Epichlorops* Becker.

Mesonotum not strongly punctured, and with distinct stripes.....12

12. Head produced anteriorly; third joint of antenna at least $1\frac{1}{4}$ times as long at base.....**Parectecephala* Becker.
Head not distinctly produced; third joint of antenna but little longer than broad; dull yellow and black, robust species, with black palpi.....**Anthracophaga* Loew.

13. Hind tibia with a distinct, curved, apical thorn on the anterior side.....14
Hind tibia without such thorn.....17

14. Frons with distinct orbital setulæ.....15
Orbits with, at most, weak hairs.....16

15. Scutellum elongated, disk flattened; male proboscis with two long apical hairs.....*Prohippelates* Malloch.
Scutellum not elongated, convex; male proboscis normal.....*Pseudohippelates* Malloch.

16. Arista flattened, strap-like.....*Ceratobarys* Coquillett.
Arista not flattened.....*Hippelates* Loew.

17. Second vein exceptionally short, third costal division much longer than second.....*Siphunculina* Rondani.
Second vein not shortened, third costal as long as, or shorter, than second.....18

18. Arista either broadened and strap-like, or with distinct pubescence.....19
Arista neither thickened nor distinctly pubescent.....22

19. Arista more or less distinctly flattened, the pubescence very close, giving the arista a knife-like appearance even when the arista itself is but slightly flattened.....20
Arista normal in shape, pubescence rather loose.....21

20. Scutellum subtriangular, the marginal bristles situated on small warts.....*Crassista* von Roser.
Scutellum rounded in outline, the margin without warts.....*Melanochæta* Becker.

21. Scutellum elongated, the disk flattened.....*Gaurax* Loew

*The line of demarcation between these genera is very unsatisfactory, and though I am rather inclined to reject *Parectecephala* as entitled to generic rank, I have not sufficient material before me to enable me to decide the matter satisfactorily.

Scutellum rounded, convex..... *Neogaurax*, n. gen.

22. More than two bristles present on posterior part of notapleura.....23

Only two bristles on posterior part of notapleura.....24

23. Generally four notapleural bristles present; mesonotum with a row of bristles on or near to posterior margin; scutellum with about eight marginal bristles; proboscis not elongated..... *Eugaurax* Malloch.

Notapleural bristles very numerous, the whole mesonotum thickly setulose; scutellum subtriangular, disc thickly setulose, apical bristles approximated; proboscis elongated and geniculated..... *Chactochlorops*, n. gen.

24. Outer cross-vein absent..... *Dicræus* Loew.

Outer cross-vein present.....25

25. Proboscis elongated and geniculated, mouth margin slightly produced and with a hair-like bristle at vibrissal angle..... *Madiza* Fallen.

Proboscis fleshy, very slightly or not at all elongated, vibrissal hair absent.....26

26. Mesonotum with three distinct longitudinal sulci..... *Tricomba* Liog.

Mesonotum not sulcate..... *Botanobia* Liog.

From an examination of the material contained in several collections, and the descriptions by many previous authors, I find that in many cases species are placed in wrong genera, and purpose at some future time publishing notes in addition to those presented herewith as a guide to those who may have occasion to identify specimens belonging to this family.

NOTES AND DESCRIPTIONS:

Neodiplotoxa, n. gen.

This genus I have erected for the reception of *Diplotoxa nigricans* Loew. Owing to the fact that this species has the hind femur very much thickened, and the hind tibia bent, it is impossible to locate it except in *Meromyza* by the use of the older keys to the genera. It differs, however, very considerably from *Meromyza* in the structure of the antenna.

Type: *Diplotoxa nigricans* Loew.

Meromyza flavipalpis, n. sp.

Similar in coloration to *pratorum* var. *americana* Fitch, the palpi being entirely yellow. It differs from that species as indicated below:

Length of lower cheek margin barely equal to height of anterior profile of head, and barely two-thirds as long as height of head at vertex; face distinctly retreating in profile..... *flavipalpis*, n. sp.

Length of lower cheek margin about 1½ times height of anterior profile of head, and slightly more than equal to height of head at vertex; face but slightly retreating, concave in centre..... *pratorum* Fallice.

In addition to the above *flavipalpis* is considerably larger than *pratorum*, 4.5–5 mm. as against 2.5–3.5 mm.

Locality of specimens of *flavipalpis*: Champaign, Illinois, June 22, 1888, two males (Marten and Hart).

Type: Illinois State Lab. Nat. Hist. collection.

Chloropisca Loew.

There is present on the postero-dorsal surface of the hind tibia in the species belonging to this genus an elongate oval, flattened area, which occupies about two-thirds of the length of the tibia. This area is slightly depressed and thickly covered with closely set, short hairs, which leads me to consider that this area is the seat of some sensory organ. I have examined examples of the following genera and find that this organ is present in varying extent in: *Chloropisca*, *Pseudochlorops*, *Crassiseta*, *Melanochæta*, and *Botanobia*, and absent in the species I have examined in *Elliponeura*, *Ectecephala*, *Meromyza*, *Neodiplotoxa*, *Diplotoxa*, *Chlorops*, and *Epichlorops*.

The amount of material available to me at present is not such that I can form any distinct idea of the significance of this organ in the classification, nor do I know what the organ may have as its function; but it is not improbable that it may prove of considerable value in classifying this rather closely allied group. It appears rather strange to me that *Chloropisca*, which has very much the general habitus of, and is very similar in food habits to *Chlorops*, should have this organ well developed, whereas the latter

genus so far as I have discovered, should not possess the organ. Possibly the examination of more material, and living examples, may throw more light upon this matter.

Chloropisca obtusa, n. sp.

Female shining yellow. Frontal triangle glossy, brownish black; basal joints of antennæ brown, upper margin of third joint blackened, the lower part yellow; face and cheeks yellow; proboscis palpi, and clypeus yellow; arista brown, yellow at base. Mesonotum with the three glossy black stripes very broad, the area between them suffused with black, giving the disk the appearance of being entirely black, the narrow black stripes before wing base separated from the sub-dorsal stripes except anteriorly; mesopleura with a small black spot; the mark on sternopleura reddish yellow, scutellum yellow; postnotum glossy black. Abdomen with a broad, black, foremarginal band on each segment. Legs yellow; apical three joints of fore tarsi and apical joint of other tarsi blackened; sensory organ not differing from colour of hind tibia. Wings clear, veins brown, last section of fourth vein less distinct than the other veins. Halteres whitish yellow.

Frontal triangle occupying about three-fourths the width of frons at vertex, carried forward of almost equal width for almost two-thirds the length of frons, then gradually tapering to just above antennæ, the apical third leaf like, the sides slightly convex, surface unpunctured, smooth; third joint of antennæ about $1\frac{1}{4}$ times as long as broad; arista about as long as width of frons at anterior margin; face slightly receding; cheek about one-fifth as high as eye; eye distinctly, but not greatly, higher than long. Scutellum distinctly broader than long, not so noticeably subtriangular as in *glabra* Meigen, the apical bristles present. Legs slender, the fore tarsi not thickened; sensory organ occupying about three-fifths the length of the hind tibia. Wing with discal cell narrow, inner cross-vein well before end of first vein; penultimate section of fourth vein distinctly longer than basal section of third, longer than last section of fifth and about half as long as last section of fourth.

Length: 3.5 mm.

Locality: Champaign, Illinois, "swept from amongst grass and weeds," May 30, 1889 (Marten).

Type: Illinois State Lab. Nat. Hist. collection.

This species may be separated from any previously described form by the obtuse frontal triangle. It is most closely allied to *glabra* Meigen.

Chloropisca glabra, var. **clypeata,** n. var.

This variety may be separated from the type form its by being larger, 3 mm., in having the third antennal joint 1¼ times as long as broad, the clypeus yellow, instead of black as in *glabra,* and the sternopleura without the black spot.

Localities: Algonquin, Illinois, September 21, 1894 (W. A. Nason), Urbana, Illinois, swept from catalpa, June 21, 1883 (Marten); Urbana, Illinois, July 15, 1887, in woods (C. A. Hart).

This form may really be a distinct species, but colour alone is not a reliable guide to the separation of species in this genus, and I till I see more material, I consider it best to give the form varietal rank only.

Pseudochlorops, n. gen.

The type species of this genus is *Chlorops unicolor* Loew. It differs from *Chlorops* in having a distinct sensory area on the hind tibia, and from *Chloropisca* in having the scutellum convex.

Prohippelates Malloch (Pr. U. S. N. M., 1913).

The type of this genus is *Hippelates pallidus* Loew. This genus and its allies, *Hippelates, Pseudohippelates* and *Ceratobarys,* have been dealt with in a paper which I have now in the press.

Pseudohippelates Malloch (Pr. U. S. N. M., 1913).

The type of this genus is *Pseudohippelates capax* Coquillett.

Siphunculina Rondani.

To this genus belongs *Siphonella reticulata* Loew.

Neogaurax, n. gen.

The type of this genus is *Gaurax montanus* Coquillett. It differs, as indicated, in the foregoing table, from *Gaurax* in the

shape of the scutellum and is more closely allied to *Botanobia* than to *Gaurax*, differing from it principally in the distinctly pubescent arista.

Chaetochlorops, n. gen.

The type of this genus is *Siphonella inquilina* Coquillett. The characters given in the foregoing table should suffice for its identification. This is the only species I know which is referable to this genus.

The other changes in generic names I have already dealt with in the Canadian Entomologist, 1913, p. 175.

A PHALANGID DRINKS MILK.

I generally have a cup of milk placed in my room, which I drink after I have finished my nocturnal rounds of my treacled trees.

The other night I saw a very fine specimen of a Harvestman (Phalangid) in the saucer. Wondering what brought him there, I managed to remove the cup without disturbing him, and found that a small quantity of milk had been spilt into the saucer and that the spider was taking a drink.

He first anchored his fourth pair of legs on the rim of the saucer; then gradually—very slowly—lowered his body till it was nearly touching the liquid. It was then tipped forward and downwards, until the mouth was in contact with the milk. After about a minute he raised himself to his ordinary standing height and began to clean his mouth, opening and shutting his mandibles (or whatever they are) like a pair of compasses. I was surprised at their size—far larger and more formidable looking than one expects from the size of the creature. Then he raised one or other of his second pair of legs and used the claw to finish the cleaning process. This done to his satisfaction he took another drink. This he did three successive times, and then, satisfied I suppose, took his departure. I noticed he was most careful to keep his feet out of milk.—E. Firmstone Heath,

The Hermitage, near Cartwright, Man.

September 6th, 1913.

A NOTE UPON THE FOOD HABITS OF ADULT TENTHREDINIDÆ.

Whilst collecting insects on the 13th of May, 1913, I was interested to observe an adult *Tenthredo variegatus* engaged in feeding upon the remains of a small Dipterous insect, and was fortunately able to secure the specimen alive and unharmed.

I kept it in confinement for some days and was able to make some observations upon the feeding habits of this species.

It was found to feed greedily upon house flies, which were seized with great violence as soon as they were introduced into the jar in which the *Tenthredo* was confined. A wound was then made in the body, into which the mouth parts were introduced and the contents of the body consumed.

On some occasions an attempt was made to drag the fly from the forceps, which were used to place it in the jar, the saw-fly shewing great excitement, constantly dashing about and jerking its legs and wings in the manner of certain predaceous wasps.

The above note is offered as a contribution to a subject upon which I believe little is at present definitely known.

E. P. Venables, Vernon, B.C.

NEW OR LITTLE KNOWN SPECIES OF APHIDIDÆ.

BY JOHN J. DAVIS, BUREAU OF ENTOMOLOGY, WASHINGTON, D.C.

(Continued from Page 87.)

Myzus circumflexum (Buckton).

(*Siphonophora circumflexa* Buckton).

(*Myzus vincæ* Gillette).

This beautiful *Myzus* was first reported in this country by Mr. F. A. Sirrine,* who found it attacking calla lily, cyclamen "dusty miller" (*Senecio cineraria*) and *Spiraxis* in greenhouses, it being especially troublesome to the calla. Prof.

*14th Ann. Rept. N.Y. Agric. Expt. Station, 1896, p. 603.

C. P. Gillette has reported it from liliaceous plants, asparagus fern, *Aquilegia*, *Rumex* sp., and *Vinca* in greenhouses, while the writer has found it common and often injurious to such greenhouse plants as *Vinca*, Asparagus fern, *Adiantum hybridum*, and calla lily, at Chicago, Ill. Specimens of this aphidid have been received from Prof. R. H. Pettit, who collected it on calla lily and *Freesia* in greenhouses at East Lansing, Mich. Recently (February 1, 1913) the writer found this species very common on sprouts of various plants in the cold plant room of the Botany Department of the Purdue Agricultural Experiment Station at La Fayette, Ind. Here it was found breeding abundantly on the following plants: *Anemone cylindrica*, *Aquilegia canadensis*, *Arabis*, *Artemisia dracunculoides*, *Aster dumosus*, *A. multiformis*, *A. paniculatus*, *Carduus floridanii*, *Malvastrum coccineum*, *Polymnia canadensis*, *Rumex obtusifolius*, *Sambucus canadensis*, *Senecio* (*foliosa*) *serra* (?) (so labeled), *Steironema lanceolatum*, *Viola nuttallii*. It was also breeding on the following, but not so abundantly: *Aquilegi flavescens* (so labeled), *Ranunculus acris*, *Rudbeckia laciniata*, and *Solidago missouriensis*. From this it will be seen that this species is capable of living and breeding on a large variety of plants, and in this respect, as well as in its habits, it resembles *Myzus persicæ* (in greenhouses) and, in fact, the two species are not infrequently found intermingled in the same colonies. Even in the cold plant room just mentioned, where during the past winter the temperature was often as low as 40° F., no sexual forms were observed.

We have recently received specimens of this species from Dr. Albert Tullgren of Sweden, and are able to identify our American forms as the same as the European. It has, so far as we are able to learn, always been referred to the genus *Macrosiphum* by European students of Aphididæ, but it is without doubt a typical member of the genus *Myzus*.

For a complete description of this species see Prof. Gillette's paper on "New Species of Colorado Aphididæ, with notes upon their life-habits," in the Canadian Entomologist, volume 40, page 19, 1908.

Myzus lycopersici (Clarke)

(*Macrosiphum lycopersici* Clarke.)

This species was first identified by Mr. H. F. Wilson as *Macrosiphum lycopersici* Clarke, from specimens collected on wheat and tomato in Montana, sent him by Prof. R. A. Cooley. The Clarke collection of Aphididæ, which contained all his type specimens, was destroyed in the San Francisco earthquake and fire, and consequently it was not possible positively to identify the species. The fact that the original description of this species agrees fairly well with the species here described, that it was found not uncommon on tomato, the type host, and that it has been found by Mr. Wilson in Oregon, where the fauna is not unlike that of the northern half of California, tend to establish the identity of this species beyond little doubt.

Wingless viviparous female.

(Pl. V, fig. 26.)

Entire body pale lemon-yellow, the head usually whitish yellow, with a more or less distinct longitudinal dorsal median line of pale green colour; also, an area at base of cornicles of a deeper yellow is usually discernible, and often one or more of the red eyes of the young within show through the body wall. Antennæ having segments I and II concolorous with head; the remaining segments whitish semitransparent, excepting a faint duskiness at tips of III and IV, the tips of V and of base of VI and the distal third of filament of VI blackish; segments III and filament of VI subequal; total length less than that of the body; one or two circular sensoria near base of segment III and the usual distal ones on V and base of VI. Eyes very dark reddish brown, apparently black under hand lens. Beak not quite reaching to coxæ of second pair of legs. Legs whitish, the tips of tibiæ brownish and the tarsi dusky to blackish. Cornicles whitish yellow and semitransparent; cylindrical, and reaching a little beyond tip of cauda. Cauda pale yellow or greenish yellow, paler than body colour.

Average measurements from 8 individuals, alive and in balsam, as follows: Length of body, not including cauda, 1.90 mm.;

length, including cauda, 2.05 mm.; width, 0.83 mm.; length of cornicle 0.42 mm.; cauda 0.26 mm.

Antennal measurements as follows:

Locality, Date, Etc.	I. mm.	II. mm.	III. mm.	IV. mm.	V. mm.	VI. (base) mm.	VI. (fil.) mm.	Total. mm.
La Fayette, Ind. (Idaho specimens*) Wheat, Aug. 23, 1912.....	0.104	0.069	0.504	0.330	0.332	0.148	0.522	2.009
La Fayette, Ind. (Idaho specimens*) Wheat, Aug. 23, 1912.....	.104	.069	.539	.348	.313	.148	.522	2.043
La Fayette, Ind. (Idaho specimens) Wheat, Aug. 24, 1912.....	....	....	.495	.313	.278	.130	....	....
La Fayette, Ind. (Idaho specimens) Wheat, Aug. 24, 1912.....	.104	.078	.504	.304	.261	.139	.487	1.877
La Fayette, Ind. (Idaho specimens) Wheat, Aug. 24, 1912.....	....	....	.470	.304	.243	.139	.435	....
La Fayette, Ind. (Idaho specimens) Wheat, Aug. 24, 1912.....	....	....	.487	.261	.226	.139	.444	....
La Fayette, Ind. (Idaho specimens) Wheat, Nov. 9, 1912.....	.096	.069	.495	.330	.269	.139	.495	1.893
La Fayette, Ind. (Idaho specimens) Wheat, Nov. 9, 1912.....	....	....	.504	.296	.278	.130	.504	....
La Fayette, Ind. (Idaho specimens) Wheat, Nov. 9, 1912.....	.096	.069	.461	.261	.261	.139	.452	1.739
La Fayette, Ind. (Idaho specimens) Wheat, Nov. 9, 1912.....	.087	.069	.478	.269	.269	.139	.470	1.781
La Fayette, Ind. (Idaho specimens) Wheat, Nov. 9, 1912.....	.096	.069	.487	.296	.296	.148	.504	1.896
La Fayette, Ind. (Idaho specimens) Wheat, Nov. 9, 1912.....	.069	.069	.487	.304	.296	.148	.487	1.887
New Richmond, Ind., Oats, Nov. 9, 1912, Female producing.....	.104	.069	.504	.365	.296	.139	.539	2.016
New Richmond, Ind. Oats, Nov. 9, 1912, Female producing.....	.104	.069	.522	.382	.313	.139	.574	2.103
New Richmond, Ind. Oats, Nov. 9, 1912, Female producing.....	....	....	.487	.330	.278	.139	.495	....

* Measurements from living specimens.

FIG. 14.—*Myzus lycopersici*, winged viviparous female.

Winged viviparous female.

(Fig. 14 and Pl. V, figs. 27–30).

Head pale yellow, with a slight dusky tint near posterior border; the antennal tubercles typical of the genus *Myzus*. Antennæ with segments I and II whitish with a slight yellowish tint, II sometimes faintly dusky, III with extreme base pale and the remainder blackish, IV and V pale with dusky to blackish tips, base of VI blackish and filament of VI pale with blackish tip (in some specimens the entire antenna excepting segments I, II and extreme base of III is blackish); segments III and filament of VI subequal, sometimes the one and sometimes the other being larger; total length less than that of the body; segment III with 18 to 26 circular sensoria, and the usual distal ones on segments V and base of VI. Eyes dark reddish brown, almost black. Ocelli bordered with conspicuous dark wings. Beak reaching only a little beyond coxæ of the first pair of legs. Thorax yellowish, with the thoracic plates yellowish brown and their apices of a darker tint. Wing veins pale brownish and narrow, branching as shown in illustration. Femora whitish, with a faint yellowish or greenish tint, the tip dusky; tibiæ pale brownish with blackish tip; tarsi blackish. Abdomen pale lemon-yellow and with a longitudinal, dorsal median line of a pale green colour, which is often more or less inconspicuous; sometimes the fall forms show three very faint dull-yellowish spots on each side of abdomen, anterior to the cornicles. Cornicles whitish, with a faint yellowish tint and semitransparent, reaching a little beyond tip of cauda, cylindrical and very slightly flaring at tip. Cauda pale yellow, slightly paler than body colour.

Average measurements from 15 individuals in balsam as follows: Length of body, not including cauda, 1.8 mm.; length, including cauda, 1.9 mm.; width 0.66 mm.; length of wing 3.6 mm, width 1.3 mm.; length of cornicle 0.43 mm., of cauda 0.22 mm. Antennal measurements as follows:

Locality, Date, Etc.	I.	II.	III.	IV.	V.	VI. (base)	VI. (fillings)	Total.
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
709. Bozeman, Mont., celery Aug. 30, 1911, J. R. Parker.	0.104	0.087	0.696	0.510	0.490	0.165	0.501	2.582
709. Bozeman, Mont., celery Aug. 30, 1911, J. R. Parker.	.104	.087	.713	.487	.417	.165	.574	2.547
707. Bozeman, Mont., wheat Aug. 26, 1912, H. F. Dietz.	.104	.078	.661	.417	.365	.156	.556	2.337
707. Bozeman, Mont., wheat Aug. 26, 1912, H. F. Dietz.	.104	.087	.643	.470	.391	.156	.574	2.355
709. Bozeman, Mont., tomato Aug. 30, 1911, J. R. Parker.	. . .	.087	.643	.470	.383	.156	.631	. . .
709. Bozeman, Mont., tomato Aug. 30, 1911, J. R. Parker.	. . . .	. . .	.626	.487	.383	.156	.643	. . .
707. Bozeman, Mont., wheat Aug. 26, 1912, H. F. Dietz.	.104	.087	.748	.522	.435	.165	.687	2.748
707. Bozeman, Mont., wheat Aug. 26, 1912, H. F. Dietz.	104	.087	.765	.539	443	.165	721	2.815
Shoshone, Idaho, oats, July 18, 1912, T. H. Parks.	.104	.087	.539	.391	.348	.156		. . . .
Shoshone, Idaho, oats July 18, 1912, T. H. Parks.	. . . .	. . . .	.504	.348	.296	.148	.539	. . .
La Fayette, Ind. (Idaho specimens), Wheat, Aug. 9, 1912.	.036	.070	.522	.356	.304	.156	.548	2.052
La Fayette, Ind. (Idaho specimens) Wheat, Aug. 9, 1912.	.036	.078	522	.348	.287	.148	.556	2.035
La Fayette, Ind. (Idaho specimens) Wheat, Oct. 10, 1912.	.104	.087	.574	.400	.365	.156	.574	2.269
La Fayette, Ind. (Idaho specimens) Wheat, Oct. 10, 1912.	.104	.087	.591	.435	.365	.165	.600	2.347
La Fayette, Ind. (Idaho specimens) Wheat, Oct. 10, 1912.	.104	.078	.635	.417	.374	.156	.591	2.364
La Fayette, Ind. (Idaho specimens) Wheat, Oct. 10, 1912.	.104	.078	.643	.400	.365	.156	.582	2.346
La Fayette, Ind. (Idaho specimens) Wheat, Oct. 11, 1912.	.104	.087	.600	.435	.383	.165	.609	2.383
La Fayette, Ind. (Idaho specimens) Wheat, Oct. 11, 1912.	.036	.078	.582	.461	.400	.156	.574	2.347
La Fayette, Ind. (Idaho specimens) Wheat, Oct. 11, 1912.	. . . .	. .	.622	.443	.383	.165	.600	. . . .
La Fayette, Ind. (Idaho, specimens) Wheat, Oct. 11, 1912.	. . . .	. . .	.591	.435	.383	.156	.591	. . . .

Locality, Date, Etc.	I.	II.	III.	IV.	V.	VI. (base)	VI. (filaments)	Total.
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
La Fayette, Ind. (Idaho specimens) Wheat, October, 1912.....	.113	.078	.696	.513	.400	.174	.643	2.617
La Fayette, Ind. (Idaho specimens) Wheat, October, 1912.....	....	....	.748	.508	.417	.165	.626	....
La Fayette, Ind. (Idaho specimens) Wheat, October, 1912.....	.121	.087	.713	.522	.365	.165	.643	2.616
La Fayette, Ind. (Idaho specimens) Wheat, October, 1912.....	.113	.078	.730	.504	.383	.165	.609	2.583
La Fayette, Ind. (Idaho specimens), Wheat, Oct., 1910, female producing oviparous females.....	.104	.087	.591	.400	.339	.148	.539	2.208
La Fayette, Ind. (Idaho specimens), wheat, Oct., 1910, female producing oviparous females.....	.104	.078	.591	.417	.348	.148	.530	2.216
La Fayette, Ind. (Idaho specimens), wheat, Oct., 1910, female producing oviparous females.....	.096	.078	.522	.348	.313	.148	.522	2.027
La Fayette, Ind. (Idaho specimens, wheat, Oct., 1910, female producing oviparous females.....	.104	.078	.504	.356	.313	.148	.522	2.025

Pupa of Male:

Entire body pale yellowish or cream colour, the abdomen with a faint pink tint in the ground colour. Neck with a decided pink tint. Abdomen with a longitudinal dorsal median area of deep pink, the anterior end of which terminates in a diffused pink area, this extending on to the thorax. Antennæ whitish, excepting V, base of VI and filament of VI (except central area of this segment), which are dusky to blackish. Eyes dark red. Legs whitish, excepting tarsi, which are blackish. Cornicles whitish.

Winged male.

(Fig. 15, Pl. V, fig. 31.)

Head pale at anterior portion, becoming dusky to brownish posteriorly. Antennæ with segments I and II whitish with a slight duskiness, the remaining segments blackish to black; from 48 to 59 circular sensoria, irregularly placed, on III, none on IV, 6 to 10 on V, not including the usual distal one, more or less in a row and

FIG. 15.—*Myzus lycopersici*, winged male.

usually on distal half of segment, the usual distal ones on base of segment VI; segments III and filament of VI subequal, the latter usually being slightly the longer; total length greater than that of the body. Eyes dark red; ocelli marked with dark rings. Thoracic lobes brownish or olive brown. Wings with fine blackish veins, the venation as for the viviparous female. Legs pale, excepting tips of femora, bases and extremities of tibiæ, and the tarsi, which are dusky to black. Abdomen pale pinkish, with the longitudinal dorsal median area darker and rather conspicuous; the area at base of cornicles yellowish; on each side, anterior to the cornicles, not visible from the dorsal aspect, are three dark spots. Cornicles whitish, semitransparent, with a yellowish tint basally, cylindrical, reaching to or slightly beyond tip of cauda. Cauda pale yellow or cream colour.

Average measurements from 9 individuals mounted in balsam: Length of body, not including cauda, 1.63 mm.; length, including cauda, 1.80 mm., width 0.59 mm.; length of wing 3.6 mm, width 1.35 mm.; length of cornicle 0.36 mm.; length of cauda 0.17 mm. Antennal measurements as follows:

Locality, Date, Etc.	I.	II.	III.	IV.	V.	VI. (base)	VI. (filament)	Total.
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
New Richmond, Ind., oats Nov. 15, 1912.....	0.104	0.087	0.714	0.539	0.487	0.191	0.730	2.852
New Richmond, Ind., oats, Nov. 15, 1912.....	.069	.087	.678	.452	.407	.165	.661	2.546
New Richmond, Ind., oats, Nov. 15, 1912.....	.096	.087	.661	.452	.435	.165	.669	2.565
New Richmond, Ind., oats, Nov. 15, 1912.....	.096	.070	.591	.424	.383	.156	.678	2.398
New Richmond, Ind., oats, Nov. 15, 1912.....	.096	.070	.591	.417	.372	.165	.626	2.337
La Fayette, Ind. (Idaho specimens) Wheat, Oct. 21, 1912.....	.104	.070	.650	.435	.435	.156	.678	2.528
La Fayette, Ind. (Idaho specimens) Wheat, Oct. 21, 1912.....	.104	.078	.591	.417	.407	.165	.609	2.371
La Fayette, Ind. (Idaho specimens) Wheat, Oct. 21, 1912.....	.104	.078	.591	.435	.407	.156	.652	2.423

Locality, Date, Etc.	I.	II.	III.	IV.	V.	VI. (base)	VI. (filament)	Total.
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
La Fayette, Ind. (Idaho specimens) Wheat, Oct. 21, 1912.....	.087	.070	.617	.389	.383	.148	.626	2.319
La Fayette, Ind. (Idaho specimens) Wheat, Nov. 1, 1912.....	.087	.070	.685	.459	.435	.174	.696	2.606
La Fayette, Ind. (Idaho specimens) Wheat, Nov. 1, 1912.....	.087	.070	.678	.452	.435	.156	.696	2.574
La Fayette, Ind. (Idaho specimens) Wheat, Nov. 1, 1912.....	.087	.070	.643	.383	.400	.156	.635	2.374
La Fayette, Ind. (Idaho specimens) Wheat, Nov. 1, 1912.....	.096	.070	.626	.400	.365	.156	.626	2.339
La Fayette, Ind. (Idaho specimens) Wheat, Nov. 15, 1912	.104	.070	.730	.522	.495	.191	.748	2.860
La Fayette, Ind. (Idaho specimens) Nov. 15, 1912.....	.104	.070	.713	.522	.495	....	....	....

Wingless oviparous female.

(Fig. 16, Pl. V, fig. 32, and Pl. VII, fig. 33.)

Head and prothorax white, remainder of body a pale cadium yellow, the last two abdominal segments paler yellow. Antennæ having segments I and II concolorous with head, the remaining segments whitish transparent, excepting tips of IV, V, base of VI and distal third of filament of VI, which are dusky; filament of segment VI the longest, being invariably longer than III; total length less than that of the body; segment III with 1 or 2 circular sensoria near base (some specimens appear to have this segment

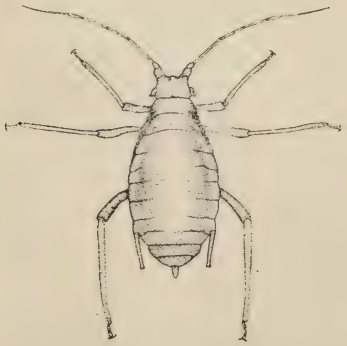


FIG. 16.—*M. lycopersici*, wingless oviparous female.

bare of sensoria) and the usual distal ones at tips of V and at base of VI. Eyes blackish. Beak just reaching to coxæ of second pair of legs. Legs whitish transparent, excepting tips of tibiæ, which are dusky, and the tarsi, which are blackish. Hind tibiæ swollen and bearing 75 or more irregularly placed circular sensoria. Cornicles whitish transparent, not quite reaching to tip of cauda in fully matured individuals. Cauda pale to whitish green.

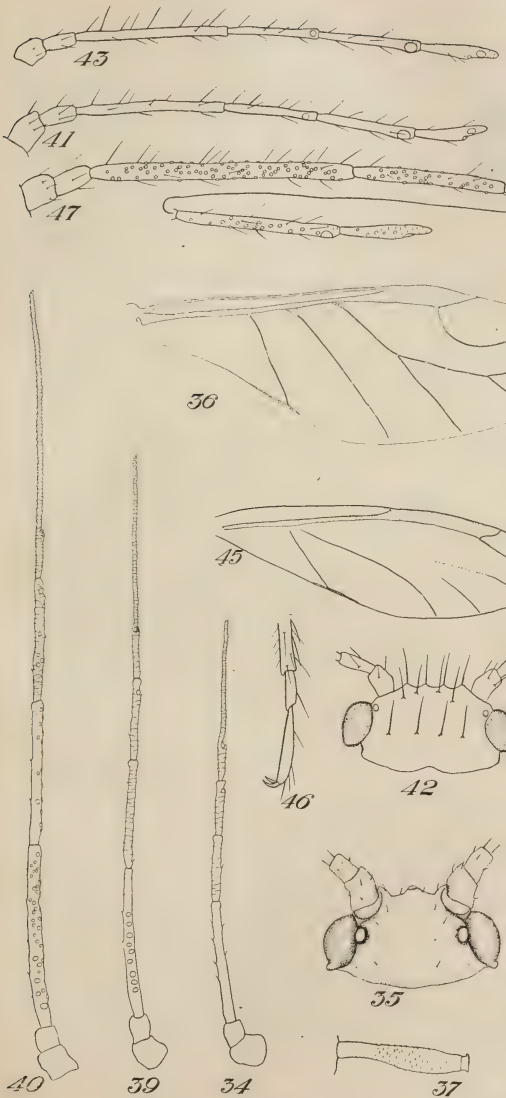
Average measurements from 5 individuals mounted in balsam: Length of body, not including cauda, 1.38 mm.; length to tip of cauda 1.48 mm., width 0.61 mm.; length of cornicle 0.295 mm.; length of cauda 0.16 mm. Antennal measurements as follows:

Locality, Date, Etc.	I.	II.	III.	IV.	V.	VI. (base)	VI. (filament)	Total.
	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
La Fayette, Ind. (Idaho specimens) Wheat, Dec. 2, 1912	....	....	0.313	0.174	0.165	0.122	0.339	..
La Fayette, Ind. (Idaho specimens) Wheat, Dec. 2, 1912	.087	.070	.296	.191	.191	.113	.391	1.339
La Fayette, Ind. (Idaho specimens) Wheat, Dec. 2, 1912	.087	.070	.296	.230	.200	.113	.400	1.366
La Fayette, Ind. (Idaho specimens) Wheat, Nov. 20, 1912	.087	.061	.339	.243	.209	.113	.383	1.435
La Fayette, Ind. (Idaho specimens) Wheat, Nov. 20, 1912	.087	.061	.356	.243	.209	.113	.409	1.478
La Fayette, Ind. (Idaho specimens) Wheat, Nov. 20, 1912	.087	.061	.278	.209	.226	.104	.374	1.339
La Fayette, Ind. (Idaho specimens) Wheat, Nov. 20, 1912	.087	.061	.287	.191	.217	.122	.400	1.365
New Richmond, Ind. Wheat, Nov. 9, 1912	.087	.061	.348	.252	.209	.113	.417	1.487

Egg

(Fig. 17.)

The egg when first laid is pale yellowish green colour, later changing to jet black. It measures 0.0678 mm. by 0.3304 mm.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During oviposition, which requires 14 minutes for the deposition of a single egg, the female holds the cauda perpendicular to the body.

FIG. 17.—*M. lycopersici*, egg.

This interesting species was first received from Mr. T. H. Parks, of this Bureau, who found it quite common on oats, first at Shoshone, Idaho, July 18, 1912, and later at Blackfoot and Idaho Falls, Idaho, August 7, 1912. The same species was received from Mr. E. J. Vosler, who collected it on oats at Salt Lake City, Utah. Later in the year (October 8) the writer found the pupæ of viviparous females, as well as wingless viviparous females, which were giving birth to the beautiful and conspicuous pinkish males, in abundance on volunteen oats near an elevator at New Richmond, Ind. Specimens collected at Bozeman, Mont., in August of 1911 and 1912 on wheat, tomato, and celery were received from Prof. R. A. Cooley and Mr. H. F. Dietz. Mr. Dietz informs me that they also found the pinkish males on wheat at the same time, although it was not known then that they and the pale yellow forms on the same plant were specifically identical.

In rearing cages at La Fayette, Ind., pink and yellow young were obtained from wingless viviparous females. The former became winged males, while the latter became winged viviparous females, which in turn gave birth to oviparous females. The winged males were quite restless in the cages containing wheat plants, as were also the sexuparæ, and it was only rarely that the latter could be induced to give birth to an oviparous female on the wheat plants, although most of those born there did feed and mature on the wheat. Mr. Dietz states that in August, at the time his collections were made, the winged forms were apparently migrating to some unknown host. The same was true at New Richmond, Ind., where the species was found in abundance on oats. Thus it seems quite probable that the males and the winged viviparous females (sexuparæ) migrate to some unknown host in the fall of the year, where the oviparous females are born and the winter eggs deposited.

Besides the plants enumerated above, we have reared this species through several generations in the insectary on rye.

(To be continued.)

MEETINGS OF THE TORONTO BRANCH.

During the first part of the present season, up to the end of the year, the Toronto Branch of the Entomological Society of Ontario has made good progress. Four new members have been elected, and there has been a distinct increase in the attendance at the meetings. Three meetings have been held at which very interesting papers have been presented. A little variety has been given by the fact that two of the papers have not been confined strictly to entomology, but have been of a somewhat wider character.

At the October meeting of the Branch, Dr. A. Cosens read a paper upon "Some Captures of the Season," exhibiting a number of specimens taken during the past summer. A considerable number of species of galls had been obtained which Dr. Cosens had not found before.

This paper was followed by an account by Dr. E. M. Walker of a peculiar insect which he found at Banff last summer. Two female specimens had been obtained, which were shown to those present, and which represent not only a new species and genus, but a new family of the Orthoptera, and appear to be of a more primitive type than any of the members of the order known hitherto.*

At the November meeting, Mr. E. Horne Craigie gave a paper entitled, "Summer Work in Scotland." He showed specimens of several species of galls obtained in Scotland during the past season, along with some specimens of similar Canadian species, which were kindly lent by Dr. Cosens. He then went on to describe the work on S. S. "Goldseeker," the scientific cruiser of the Fishery Board for Scotland, on which he spent some time this summer, working in the North Sea and the Faroe, Shetland Channel. The paper was illustrated by lantern slides and specimens.

At the December meeting Mr. Kenneth F. Auden gave an address upon "Arthropoda of the Bahamas," illustrating his remarks by specimens which he had brought from the Bahamas this summer. About one hundred insects and a large number of crustaceans, etc., were exhibited.

Dr. E. M. Walker then addressed the meeting upon the subject of "Primitive Insects," pointing out just what the term implied, and describing some of the primitive characters of certain of the

**Grylloblatta campodeiformis* Walk., Can. Ent., 46, pp. 93-99.

Thysanura and Collembola, particularly of the genera Machilis and Japyx of the Thysanura. These were compared with Scolopendrella, the typical genus of the class Symphyla, and the closest living relative of the insects. Specimens of these forms were shown, in which most of the features referred to were pointed out.

The Branch was favoured with the presence at this meeting of Mr. Arthur Gibson, Chief Assistant Entomologist of the Division of Entomology, Ottawa, who gave an interesting outline of the work of the Division both at Ottawa and in the field. He stated that since the new Division had been established in 1908, under the direction of Dr. Hewitt as Dominion Entomologist, the work had increased very rapidly. This was largely due to the finding of nests of the Brown-tail Moth in importations of nursery stock from Europe, which necessitated the passing by Parliament of the Destructive Insect and Pest Act (under the provisions of which nursery stock entering Canada is inspected by inspectors of the Division) and the establishment of Field Stations in the different Provinces. The field work in Nova Scotia and New Brunswick in connection with the Brown-tail Moth was discussed and many questions asked by members present. Mr. Gibson spoke of his own and Mr. Strickland's work in Alberta in the control of a Cutwrom (*Porosagrotis orthogonia*) which during the past three years had devastated many wheat fields. A preliminary report on the investigation was presented at the recent meeting of the Association of Economic Entomologists. E. Horne Craigie, Sec.-Treas.

CANADIAN ENTOMOLOGICAL SERVICE.

Mr. R. Neil Chrystal, B.Sc., of the University of Edinburgh, has been appointed a Field Officer for Forest Insect Investigations in the Entomological Branch of the Department of Agriculture, Ottawa. Mr. Chrystal, who is the son of Dr. Chrystal, Professor of Mathematics in the University of Edinburgh, graduated in forestry, including entomology, and afterwards studied forestry methods in Germany. During the last year he has been specializing on forest insects under Dr. R. Stewart MacDougall at Edinburgh University and Prof. Maxwell Lefroy of the Imperial College of Science, London. He will be detailed for work in British Columbia during the coming summer.

NEW GENERA AND SPECIES OF TENTHREDINIDÆ: A FAMILY OF HYMENOPTERA.*

BY ALEX. D. MACGILLIVRAY, UNIVERSITY OF ILLINOIS, URBANA, ILL.

(Continued from page 108).

Astochus aldrichi, n. sp.—Female: Body black with the antennæ, a short, fine line on the inner orbits, the legs below the trochanters, and the abdomen beyond the basal plates, rufous; the following parts: the labrum, a spot on each side of the labrum, a narrow interrupted band on the edge of the pronotum, the tegulæ, an ovate spot on the mesopleura, a spot above the posterior coxæ, the front coxæ beneath, the hind coxæ beneath and at sides, the trochanters, and the stigma in great part, yellowish white; the ocellar basin elevated at sides and concave at middle; the frontal furrow deep and broad, extending to the supraclypeal area; head and thorax polished; postocellar area broader than long, with a deep median furrow, interrupting the posterior margin of the head; the wings slightly infuscated; the saw-guides convex above and below, convergent toward apex, obliquely truncated at apex. Length, 8 mm.

Habitat.—Juliaetta, Idaho.

This specimen was collected by Professor J. M. Aldrich, for whom the species is named.

Kincaidia, n. gen.—Front wings with the radial cross-vein, the radio-medial cross-vein, the free part of R_5 and R_4 present; the medio-cubital cross-vein joined to R+M some distance before the origin of M; Sc_1 wanting; the free part of R_5 and the transverse part of M_2 not interstitial; the free part of the second anal vein short, erect, transverse; the contraction of the third anal vein indicated; the hind wings with the free part of R_4 and the transverse part of M_2 present; the first anal cell almost as long as the one in front of it; antennæ with nine segments; compound eyes with the inner margins parallel and distant; the basal plates divided; the claws cleft. Type, *Tenthredopsis ruficorna* MacG.

This genus is related to *Astochus*. It is named for Professor Trevor Kincaid, from whom I have received many interesting species of sawflies from the Pacific Coast.

* Contributions from the Entomological Laboratories of the University of Illinois, No. 37.

Neopus MacG.—Front wings with the radial cross-vein, the radio-medial cross-vein, the free part of R_4 and R_5 all present; the medio-cubital cross-vein joined to R+M a considerable distance before the origin of M; Sc_1 obsolete on its costal half, located near the medio-cubital cross-vein; the free part of the second anal vein short, erect, and transverse; the contraction of the third anal vein indicated; hind wings with the free part of R_4 and the transverse part of M_2 wanting; antennæ with nine segments; the clypeus emarginate; compound eyes with their inner margins straight and parallel and distant; the basal plates divided; the claws cleft. Type, *Tenthredopsis 14-punctatus* Norton.

This genus is related to *Tenthredopsis*. This name was first used in Smith's Report of the Insects of New Jersey, 1910, p. 585, where it is properly accredited. Mr. S. A. Rohwer, in a paper on the genera of the Tenthredinoidea, has accredited this name and some others by the writer, used for the first time in this list, to Mr. H. L. Viereck. It is unfortunate that such references should have been used in a paper of this sort. Mr. Rohwer's conclusions in respect to the authority for these names is discussed by Mr. Viereck in the Proceedings of the Entomological Society of Washington, Vol. 13, 1911, p. 94.

Tenthredo neoslossoni, n. sp.—Female: Body black, with the following parts yellowish white: the clypeus, the labrum, mandibles at base, spot on the supraclypeal area, the collar, the scutellum, a spot above the posterior coxæ, the sides of the basal plates, and the tarsi, yellow; the following parts rufous: the antennæ, a minute spot on each inner orbit, the tegulæ, the front femora beneath, the front and middle tibiæ, the basal three-fourths of the hind tibiæ, and abdominal segments two to four; antennæ with the third segment distinctly longer than the fourth; the clypeus deeply emarginate; the head and thorax roughened; the wings yellowish, the veins, including the costa and stigma brownish; the saw-guides bluntly rounded at apex. Length 10 mm.

Habitat.—Franconia, New Hampshire, Mrs. Annie Trumbull Slosson, Collector, for whom the species is named.

This species belongs to the mellina and redimacula group.

Macrophya melanopleura, n. sp.—Female: Body black, with the following parts yellowish white; the clypeus, the labrum, the basal segment of the antennæ, the collar broadly, the tegulæ, the scutellum, the postscutellum, the basal plates, the front and middle legs, the hind coxæ except the part beneath, the hind trochanters, the basal half of the hind femora, a broad ring on the hind tibiæ, and the hind tarsi; the third segment of the antennæ longer than the fourth; the head and thorax coarsely and densely punctured; the saw-guides with the upper and lower margins straight, subparallel, the apex obliquely truncated with the angles rounded. Length 9 mm.

Habitat.—Massachusetts. Received from the Hatch Experiment Station, Amherst, Massachusetts, through Professor H. T. Fernald.

A species related to *fascialis* Nort. and *varia* Nort. from which it is differentiated by having well-developed vertical furrows.

Macrophya confusa, n. sp.—Female: Body black, with the clypeus, the labrum, the mandibles, the collar, the tegulæ, a band on the pleuræ, a spot above the hind coxæ, the front and middle legs except a spot on the apex of their femora beneath and the apices of their tibiæ, the hind coxæ and trochanters, the basal half of the hind femora, a ring on the hind tibiæ, and the hind tarsi except the apices of the segments; the antennæ with the third segment longer than the fourth; the head finely punctured; the wings hyaline, the veins and stigma brownish; the saw-guides obliquely, bluntly rounded. Length 9 mm.

Habitat.—Pennsylvania. Received through Professor C. F. Baker.

This species is related to *pulchella* Klg., from which it differs in the amount and coarseness of the punctuation on the mesopleura.

Macrophya ornata, n. sp.—Female: Body black, with the following parts white: the clypeus, the labrum, the mandibles, the collar, the tegulæ, the scutellum, the front legs except a fuscous line on the tibiæ at apex above, the middle legs except a ring on the apex of the tibiæ, the apical half of the hind coxæ, the hind trochanters, the basal one-third of the hind femora, a ring on the hind

tibiæ, and the hind tarsi beyond the middle of the first segment; the abdomen except the saw-guides rufous beyond the basal plates; the third segment of the antennæ distinctly longer than the fourth; the head finely punctured; the wings slightly infuscated, the veins, including the costa and stigma, brownish; the saw-guides bluntly rounded at apex. Length 8 mm.

Habitat.—Ithaca, New York.

This species is related to *nidonea* from which it differs in the colour of the abdomen.

NOTES ON THE WINTER AND EARLY SPRING COLEOPTERA OF FLORIDA, WITH DESCRIPTIONS OF NEW SPECIES.

BY W. S. BLATCHLEY, INDIANAPOLIS, IND.

(Continued from Page 92.)

6611. **Bassareus croceipennis** Lec.—Quite frequent at Sanford and Ormond on oak in blossom. March 28–April 13.

6621. **Cryptocephalus bivius** Newm.—Three examples of this large and handsome species were beaten singly from oak at Dunedin, Eustis and Sanford. March 21–April 7.

Cryptocephalus sanfordi Bl.—Three additional specimens were taken at Sanford and one at Dunedin. March 29–April 9.

6638. **Cryptocephalus incertus** Oliv.—Quite frequent at Dunedin and at various points along the Kissimmee River on flowers of the Ericad—*Andromeda nitada* Bart. January 21–March 21.

6644. **Cryptocephalus tinctus** Lec.—One example from the same Ericad. Istokpoga Creek, February 26.

6645. **Cryptocephalus lateritius** Newm.—Three specimens at Dunedin from the same shrub. January 15-March 19.

6668. **Pachybrachys limbatus** Newm.—Six specimens beaten from oak at Ormond. April 3–April 14.

6890. **Diabrotica vincta** Lec.—Two examples beaten from a tall ragweed (*Ambrosia sp.*?) near the mouth of Taylor's Creek on Lake Okeechobee, March 3.

6932c. **Œdionychus concinne** Fab.—A half dozen or more beneath boards and other cover along the margins of shallow fresh water lakes just east of Dunedin. February 7–March 24. One also at Ormond, April 6. I regard this as a distinct species, and not a variety of *vians* Ill., as listed. Aside from the differences in colour, it is much more finely and indistinctly punctate than *vians*.

Haltica schwarzi, sp. nov.—Oblong-oval, feebly convex. Above, uniform piceous, strongly bronzed or brassy; joints 4—10 of antennæ piceous, finely pubescent, the three basal joints dark reddish; under surface and legs piceous. Eyes large, coarsely granulate. Thorax one-third wider than long, sides feebly rounded, ante-basal impression entire; disc convex, feebly constricted near the apex, finely and very sparsely punctate. Elytra at base nearly one-half wider than thorax, sides parallel for three-fourths their length, then broadly rounded into apex; disc very finely alutaceous, distinctly but sparsely punctate, the punctures ending to form regular rows; a broad and shallow impression behind the scutellum; umbone not prominent. Under surface finely and closely punctate. Length 4.2—4.5 mm.; width 2.3 mm.

Frequent on semi-aquatic plants along the shores of Lake Okeechobee. March 3–March 7. Larger than *H. ignita* and uniform in colour as described. Umbone less prominent, its inner limiting depression obsolete. Elytra relatively longer, less convex, and more distinctly punctate. Of it Mr. E. A. Schwarz (to whom, for his many favours, I dedicate the species) says: "This is one of the various (at least four) good species which we lump in collections under the name *Haltica ignita*."

Longitarsus cotulus, sp. nov.

Oblong, narrowly oval, slender, apterous. Upper surface uniform pale yellowish testaceous, finely but distinctly alutaceous; under surface dusky. Antennæ slender, two-thirds as long as body, outer joints dusky, the second, third and fourth joints subequal in length. Thorax not wider than long, sides broadly rounded, disc

very finely and sparsely punctate. Elytra one-fourth wider at base than thorax, rather convex, umbone obsolete, sides parallel from just behind humeri two-thirds or more to apex, thence gradually converging to tips; disc finely and sparsely punctate, the punctures a little coarser than those of thorax. Wings absent. Length 1.7 2 mm.

Described from seven specimens swept from herbage at Kissimmee Dunedin, Eustis and Sanford. February 16-April 7. According to Schwarz it is "very common in Florida on Mayweed or dog-fennel (*Anthemis cotula* L.), whence the specific name.

Allied to *testaceus* Melsh, but body distinctly smaller, more slender and more parallel; inner wings and umbones absent and elytra much more finely and indistinctly punctate.

7031. **Phyllotreta robusta** Lec.—Taken in large numbers at Sanford by sweeping herbage along borders of cypress swamps. Described from Garland, Colorado, and recorded elsewhere only from Lake County, Indiana.

10,467. **Psyllobora elegans** Horn.—Three specimens taken by sweeping—one at Sanford, two at Ormond. April 3–14.

7075. **Chalepus scapularis** Oliv.—Three examples of this species and about a dozen of the more handsome *C. bicolor* Oliv., were taken by sweeping low herbage along the border of a cypress swamp at Sanford. April 5–9.

7095. **Porphyraspis cyanea** Say.—Mention is made of this rather common species to record the taking of several black specimens along the Kissimmee River. It occurs only on the leaves of the Saw palmetto, *Serenoa serrulata* Hook, which is probably the most common shrub in Florida

7400. **Merinus lævis** Oliv.—A single specimen of this large Tenebrionid was taken from beneath pine bark near Ormond on March 24. Horn, in his "Tenebrionidæ of America," records it from the "Eastern and Middle States and more rarely in Canada." It is uncommon in Indiana, and I can find no previous record of its occurrence in Florida.

7408. **Glyptotus cribratus** Lec.—Four specimens were beaten from large bunches of Spanish moss near Dunedin. March 18—27

7426. **Opatrinus aciculatus** Lec.—This appears to be far more common in Central and Southern Florida than *O. notus* Say. Numerous specimens were taken at Dunedin and on the Kissimmee River trip. It occurs beneath cover in moist sandy localities. January 20–March 24.

7487. **Eutochia crenata** Lec.—Sifted one specimen from a dead fungus near Dunedin. January 23.

Platydema subquadratum Mots. — One example, so named for me by Mr. Schwarz, was taken from an oak tree fungus near Dunedin, March 16. It is 7.5 mm. in length, shining black, with legs and basal joints of antennæ pale, and with elytral rows of punctures very small, close-set and unimpressed.

7535. **Hypophlœus thoracicus** Mels.—Three examples from beneath bark of dead pine in open woods. Sarasota, January 28.

7575. **Talanus (Dignamptus) langurinus** Lec.—Quite common on the custard apple (*Anona glabra* Dunal) and a wild cucumber (*Melothria pendula* L.) along the borders of Lake Okeechobee and the lower stretches of the Kissimmee River. March 1–7. All the specimens taken were a shining dark chestnut brown, not black as described. Length 3.5–7 mm.

I fully agree with Dr. John Hamilton (Can. Ent., XXVII, 321) that *T. stenochinus* and *langurinus* are only different sizes of the same species, the latter and smaller perhaps being the male. He states that Dr. Horn had come to the same conclusion and that the name *langurinus* should be given to both.

Talanus okeechobensis, sp. nov.

Elongate, subcylindrical, robust. Dark chestnut brown, shining; antennæ and legs slightly paler. Antennæ as long as head and thorax, the joints gradually stouter, the 8th, 9th and 10th wider than long. Head finely and rather densely punctate. Thorax slightly longer than wide, feebly narrowed at base; apex rounded, base truncate; hind angles small, rectangular, acute, disc convex, rather coarsely, closely and unevenly punctate. Elytra very distinctly wider than thorax, strongly convex, deeply striate, the striæ rather finely serrate punctate; intervals convex, minutely punctulate. Abdomen finely and very sparsely punctate. Front tibia with a strong tooth one-third from apex. Length 6–6.5 mm.

Two specimens beaten from custard apple at Lake Okeechobee. March 6. In *langurinus* the body is much more slender, thorax longer than wide, elytra much narrower, scarcely striate, intervals flat, front tibiæ not toothed.

7590. **Allecula atra** Say.—One, beaten from oak. Eustis, April 5.

Hymenorus granulatus Bl.—A female, 9 mm. in length, was taken at Ormond, April 14.

Isomira ignora, sp. nov.

Elongate, narrowly oval, convex. Uniform pale rufo-testaceous, shining; sparsely clothed with very short fine prostrate yellowish hairs. Head small, half the width of thorax, finely and densely rugosely punctate; eyes small, separated by twice their own diameters; antennæ slender, scarcely half the length of body, second joint half as long as third, the latter equal to fourth. Thorax at base two-thirds wider than long, sides nearly straight and parallel on basal half, thence converging and rounding into apex, disc punctate like the head. Elytra at base scarcely wider than thorax, sides parallel for three-fourths their length, thence gradually rounding into apex; disc very finely and rather sparsely punctate the punctures in places tending to form short transverse strigæ. Length 5 mm.; width 2.5 mm.

Nine specimens beaten from oak. Dunedin, March 15–24; Sanford, March 29; Ormond, April 3. Paler and much narrower than *I. quadristriata* without trace of sutural striæ.

7610. **Isomira valida** Schwarz.—Two specimens beaten from oak near Eustis, April 6. A robust species, 7–8 mm. in length.

10,710. **Eustrophus repandus** Horn.—One from woody fungus near Dunedin, in company with *E. bicolor*, the latter common. March 16.

Chrysanthia repanda Horn.—Common on the flowers of the farkleberry at Sanford and Ormond. March 28–April 14. Taken on no other plant. The elytra of all were a very handsome purple in hue.

8060. **Macrobasis torsa** Lec.—Three from flowers of thistle. Sarasota, March 28.

(To be continued.)

SUNFLOWERS AS A LURE FOR THE PLUSIIDÆ

This season most of my sunflowers, being self-sown, were in bloom a good two weeks earlier than usual and were in greater profusion. They also lasted well into the fall.

I had noticed in previous years, when I had a good show of the flowers, that quite a number of species were attracted; consequently this year, with such a quantity out at once, and so early, I was particularly on the watch for things moving at dusk in that part of my garden.

Early "sugaring" having proved a failure, I had fallen back on collecting "at light" on suitable evenings when I could manage it, with a preliminary stroll around the flower beds with my net. Many good evenings were missed early in August, owing to other engagements or occupations, but during the latter part of the month, and the first two weeks of September, I was able to make a round nearly every evening, when the weather was favorable.

The list of species taken is as follows:

2475.—*Plusia aeroides* Grote. Aug. 3rd (1). Half a dozen specimens were also taken at light in July this year. I never took *aeroides* in Victoria, and but a single specimen during the previous seven years of my residence on Quamichan Lake.

2477.—*Plusia metallica* Grote. Aug. 30th to Sept. 13th (3). One of them my small daughter, Phyllis, netted off the flowers in the afternoon. I have always found the species rare.

2479.—*Euchalcia putnami* Grote. Aug. 21st to 24th (3). Also one at light on July 24th. I think this species may be double brooded with us, for I have taken it earlier in the year. I have always found it rare, however.

2481.—*Eosphoropteryx thyatiroides* Guenée. Aug. 10th (1). I have captured this rarely in previous years off a small species of sunflower, coming into bloom earlier. I took the species one season in Elm Park, Winnipeg (Aug. 18th) off a species of wild sunflower, when I was out sugaring.

2492.—*Autographa californica* Speyer. Aug. 21st to Sept. 16th. Not abundant like *celsa*, and, while in beautiful condition, most were allowed to go. The species is double brooded here.

2505.— " *rectangula* Kirby. Aug. 4th to 29th. In all seven specimens.

2509.— " *selecta* Walker. Aug. 23rd to Sept. 12th (3 or 4).

2514.— " *celsa* Hy. Edw. Aug. 20th to Sept. 15th. This was by far the most plentiful species coming. Several nights I bottled as many as two dozen, all in good condition, and captured altogether, I dare say, considerably over 150 specimens. It shows quite a wide range of variation in the silver Y, or markings, and in size and colour, some individuals being almost black on the primaries. This species is a bit of a day-flier also.

2515.— " *epigæa* Grote. Aug. 25th to Sept. 15th. About a dozen were taken.

2517.— " *ampla* Walker. Aug. 22nd (2). This species is usually fairly abundant at light a little earlier in the season.

2524.— " *corrusca* Strecker. Sept. 5th to 16th. About half a dozen. This species can generally be taken freely at light early in July, and from the above late catch (the specimens being fresh) it would appear to be double brooded here.

As several (3) 2482, *Autographa mappa*, G. and R,. were taken at light early in July, the season would seem to have been a good one for this class of noctuids.

Off the sunflowers these moths were very easily "bagged." I used a quart "economy" jar, charged with cyanide, the same as I use for "sugaring." It was quite easy to bottle them off the flower heads, sometimes two at a time, and few were missed; no net was required at all; in fact, one was rather in the way.

Other species taken or attracted were *Noctua baja*, *Feltia herilis* (common) and *subgothica*, *Paragrotis vetusta* (1), *Mamestra stricta* and *pensilis* (1), *Dargida procinctus* (3), *Heliophila roseola* (1), a few

Geometridæ, and *Phlyctænia ferrugalis* and *profundalis*; these two kinds in abundance.

I can recommend this method of collecting to anyone interested in the *Plusiidæ;* the moths come freely, preferring sunflowers to any other kind of flower that I have grown for this purpose, they they are easily taken, and with a minimum of rubbing. Moreover, the seed is cheap and the plants very easily grown anywhere.

A. W. HANHAM, Quamichan Lake, Duncan, B.C.

BOOK REVIEWS.

THE LIFE STORY OF INSECTS. By Prof. G. H. Carpenter (Cambridge Manuals of Science and Literature), 134 pp., 23 figs. Cambridge University Press. Price, one shilling.

Notwithstanding the existence of numerous entomological books of an elementary character, the treatment of the subject in the present little volume makes it peculiarly suitable to place in the hands of a person having no knowledge of insect life. It does not attempt to accomplish more than "an outline sketch of the facts and meaning of insect transformations," and, in the modest words of its author, the "humble volume will best serve its object if its reading should lead fresh observers to the brookside and woodland." We feel that its object will frequently be served, for it cannot fail to stimulate an interest in an enquiring mind in the study of insect life in its varied forms and it is sure to be the means of directing many a wayfarer's steps into the fascinating paths of entomological enquiry.

After describing the form and growth of insects, the life-histories of certain sucking insects, such as the aphids, are given. The author then passes on to a consideration of the adaptations and transformations of aquatic insects. This leads him to a discussion of the internal changes which accompany metamorphosis. A most readable account of the different larval forms and their adaptations constitutes the longest chapter in the book and the well-chosen illustrations contribute greatly to its clearness. A consideration of the varied pupal forms and their modifications naturally follows. A chapter on the life-story of insects in relation to the seasons succinctly portrays the varied life-cycles in relation to the seasons of the year and to seasonal conditions. The book concludes with an interesting chapter on the past history of insect life. In this the

author takes up the different views regarding the development of the insects of to-day and the manner in which the evolution of the highly developed insect with a complete metamorphosis may have taken place. A short bibliography will guide the student to further reading. We heartily congratulate Prof. Carpenter on the pleasing results of what has been by no means a light task, and we feel sure that it will serve to add many new recruits to our ever-increasing army. C. Gordon Hewitt.

A Synopsis of Economic Entomology. By W. Lochhead, Professor of Biology, Macdonald College, Ste. Anne de Bellevue, P. Que. 113 pages.

This work, which has evidently been prepared by the author as a basis for his lectures on Entomology, will be found very useful by others with similar duties to fulfil and especially by science teachers in High Schools and Collegiate Institutes, who are unable to devote much time to the study of insects. Owing, however, to the entire absence of illustrations and the use of terms which are not explained, it will require to be supplemented by some such guide as Comstock's "Manual for the Study of Insects." For these reasons also it can hardly be recommended as a text-book for students.

The author might well have enlarged the title to a Synopsis of Systematic as well as Economic Entomology, as the book is nearly equally occupied by the consideration of both these aspects of the subject.

The work is divided into four parts. The first describes the external and internal anatomy of insects and their metamorphoses, the losses due to them, and an account of those that may be termed beneficial. Part 2 contains keys to insects injurious to farm, garden and orchard crops, including small fruits. These are arranged under the headings of attacks upon roots, trunks or branches, leaves and fruit. Part 3 occupies more than half the volume and is devoted to "a classification and description of common insects" given in the form of keys to orders and families, followed in each case by brief descriptions of the more important species from an economic standpoint. Part 4 describes the various methods, both cultural and artificial for the control of insects.—C. J. S. B.

Mailed April 11th, 1914.

The Canadian Entomologist.

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AMERICAN TRICHOPTERA—NOTES AND DESCRIPTIONS.

BY NATHAN BANKS, EAST FALLS CHURCH, VA.

In the following pages are descriptions of various new caddice-flies, mostly from my own collection. I have given a new arrangement of the genera of the Hydropsychidæ based on a salient, but hitherto unused character, which makes the classification of this family easier than before.

PHRYGANEIDÆ.

Neuronia smithi, n. sp. (Pl. VIII, fig. 11).

In general similar to *N. concatenata,* but the irrorations on the wing a little further apart, and much less wavy; the vertex wholly pale yellowish, the thoracic notum also pale, but rather dark each side. Venation generally as in *N. concatenata,* but the first fork does not reach half way back on discal cell (in *concatenata* much more than half way). The lower appendages of the male have the apical spine longer and less curved than in *N. concatenata.*

Expanse 23 mm.

From Lakehurst, N. J., 4th July (Englehart). Named in memory of the late Dr. J. B. Smith.

LIMNEPHILIDÆ.

Limnephilus spinatus, n. sp. (Pl. VIII, figs. 8, 9).

Palpi yellow; face dark, with yellow hairs, vertex and thorax dark, with some yellow hair and black bristles; antennæ brownish, the basal joints darker; abdomen black above and on the sides, vertex pale; legs yellow, with black spines, those on tibia 1 are very short; wings, except costal and subcostal areas, are brown, marked with pale spots, these most numerous in front and along the veins, basal part of apical cells pale, beyond the brown is densely spotted with minute pale dots, the usual median oblique mark is distinct; hind wings hyaline, venation yellowish. In the fore wings

the discal cell is no longer than the pedicel, and in hind wings the discal hardly reaches before the fork of the median.

Expanse 26 mm.

From Vineyard, Utah, 27th August (Spalding).

Limnephilus productus, n. sp. (Pl. X, figs. 29, 36).

Palpi yellowish brown, face brown, with much golden yellow hair, and some black bristles; vertex brown, with yellow hair and brown bristles; antennæ yellowish brown, basal joint darker; thorax with black bristles and yellow hair. Abdomen dull black, apex of segments paler; legs yellowish, spines black, those on tibia 1 very short. Wings mostly pale, but area behind median is dark brown, and more or less broken by pale spots, mostly along median vein, some dark spots along radius, longitudinal veins with dark streaks, a hyaline white mark on the thyridium and one on arculus; hind wings pale, with pale venation. In fore wings the discal cell barely reaches before the fork of median. In hind wings fork 5 is no longer than its pedicel, and in hind wings the discal cell begins a little before the posterior anastomosis.

Expanse 27 mm.

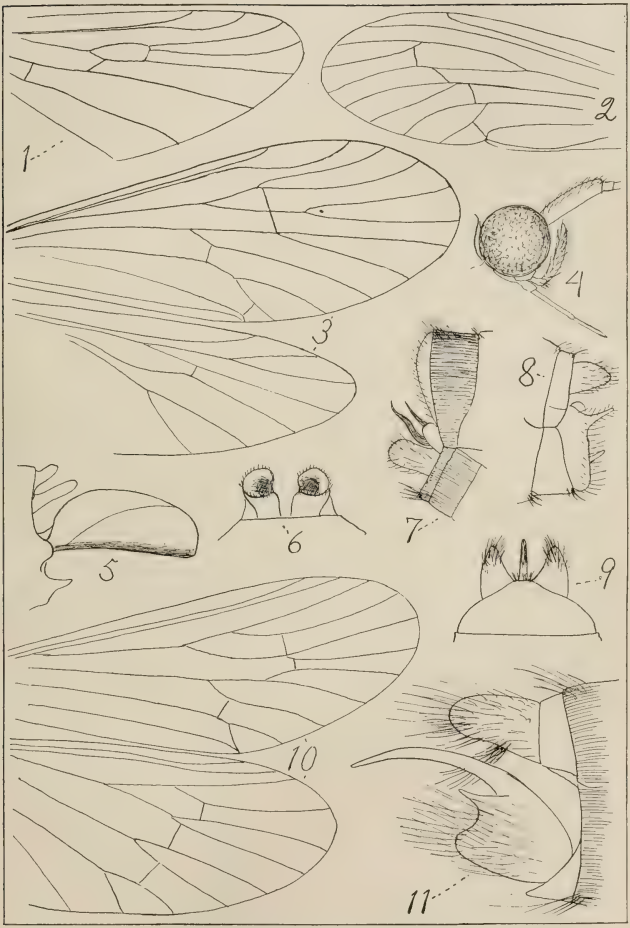
From Vineyard, Utah, 27th August, at sugar, (Spalding).

Limnephilus æqualis, n. sp. (Figs. 14, 31).

Palpi pale, very slender, face with yellow hair; vertex darker in front, pale behind, with gray hair, and dark bristles, thorax pale above, with yellowish hair; abdomen pale yellowish, tips of male genitalia black; legs yellowish, with black spines, those on tibia 1 as long as width of the joint. Wings mostly brownish behind, pale in front, costal area unmarked, the brown much broken up, the usual oblique median mark, large pale space below stigma, over base of apical cells, and just before the anastomosis, and extending outward over tips of the first and second subapical cells; few marks in the radial or discal areas, and base of wings is mostly pale; hind wings pale, venation, yellowish. In fore wings the discal cell is longer than its pedicel; in hind wings the discal reaches very much before the fork of median.

Expanse 25 mm.

From Bon Accord, British Columbia, 7th June, (Russell).



NEW AMERICAN TRICHOPTERA

Limnephilus secludens, n. sp. (Figs. 17, 27).

Palpi yellowish, very slender; face dark, with yellow hair; vertex and thorax dark, with yellowish hair and dark bristles; abdomen dull black above, venter pale; legs yellowish, spines black, tibia 1 with very short spines; wings mostly pale, but brownish behind and these faintly broken with pale, a blackish mark on thyridium; hind wings pale, venation yellowish. Fore wings with the discal cell longer than its pedicel; hind wings with discal cell hardly reaching before fork of median. The dark, median pieces of male genitalia are only visible from behind.

Expanse 20 mm.

From Penticton, British Columbia, 9th August (Wallis) and Saskatchewan, July.

Limnephilus argenteus, n. sp. (Fig. 13).

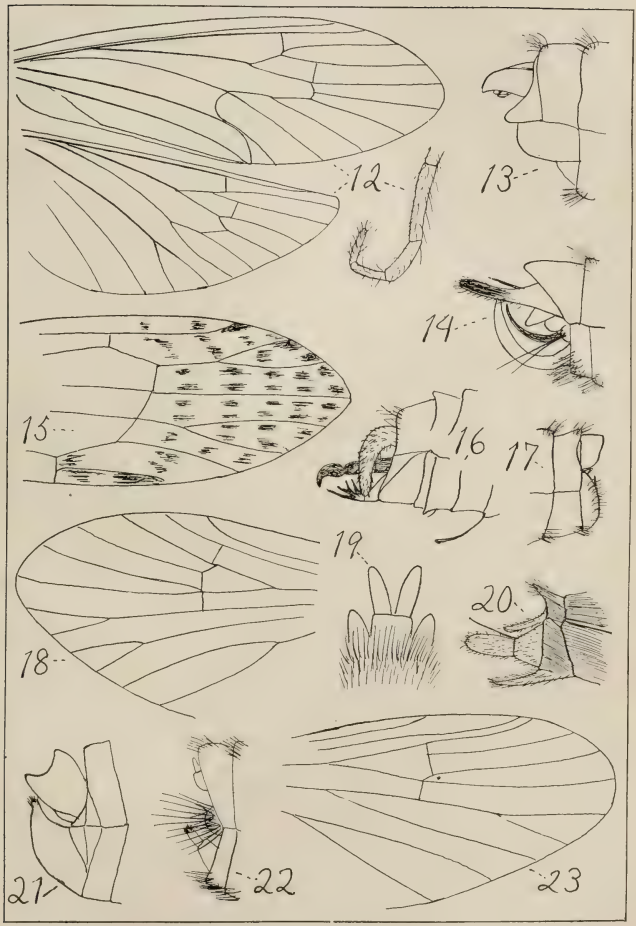
Palpi brownish, face brown with black bristles; vertex dark, pale behind; antennæ brownish, faintly annulate, thorax grayish brown, with black bristles and some white hairs near base of wings; abdomen black, tips of segments pale; legs pale yellowish, with black spines, no dark marks on tibiæ. Wings brown, densely guttated with silvery marks, large oblique spot near the middle, several near the thyridium and in base of first subapical cell, and near base, but not extreme base, of apical cells with silvery spots, smaller silvery spots all over the wing, costal area with brown marks. Venation as in *L. gravidus*; in hind wings the fourth apical cell is plainly narrower than the second, but not acute, the cross-vein from base of fork 5 up to upper median is much more convex basally, and the lower median more fractured than in *L. gravidus*. The pronotum is longer and more flat above than in that species. The hind wings are excised as in that species, and in *Colpotaulius*, but the shape of fore wings and general appearance more like *Limnephilus*.

Expanse 35 mm.

From Nipigon, Ont., 18th June (Walker).

Stenophylax hesperus, n. sp. (Figs. 6, 21).

Palpi yellowish; antennæ dark brown, black on basal joint, paler towards tip; face yellow, with black bristles; vertex yellow,



NEW AMERICAN TRICHOPTERA

with a large median black spot between ocelli and extending back, bristles black; pronotum pale, mesonotum brown, the mesothoracic strips pale, rest of thorax pale; abdomen pale brownish, yellowish below; legs yellowish, with black spines. Wings nearly uniform pale brownish, clothed with fine black hairs; venation pale, a hyaline white mark on thyridium, and also on arculus; hind wings pale grayish, rather darker on the costal tip; fore wings with the discal cell twice as long as the pedicel, fork 1 its width back on discal, fork 3 a little back of anastomosis, lower median not fractured at base of fork 5; the spot in the base of fork 2 is pale; in the hind wings fork 3 extends back farther than in the fore wings; the discal cell extends much before forking of median vein.

Expanse 47 mm.

From Departure Bay, Vancouver Island, British Columbia, 1st August (Walker).

Stenophylax flavata, n. sp. (Figs. 32, 33).

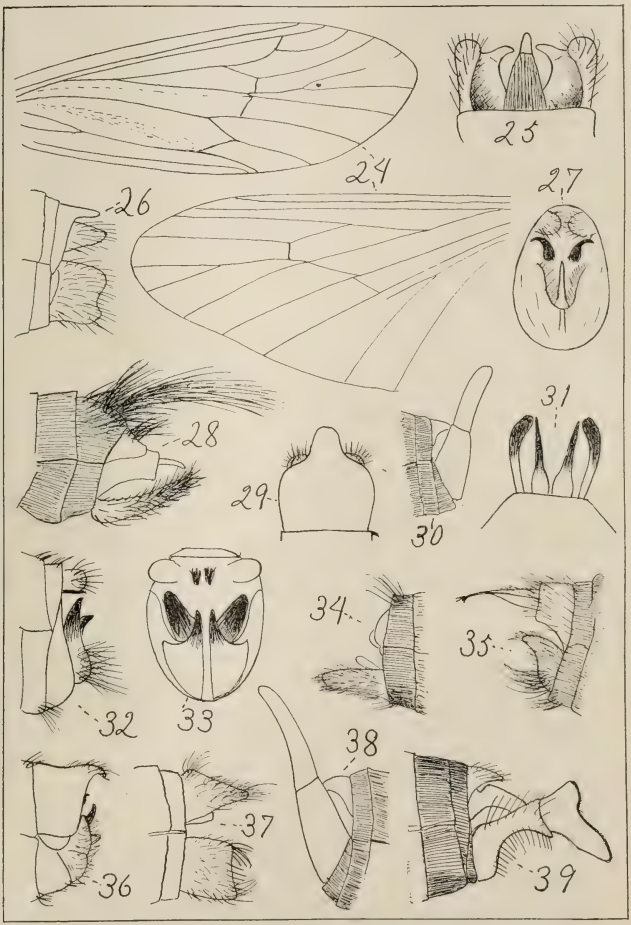
Yellowish with yellowish hair; palpi and antennæ yellowish; ocelli rather large, no ocellar macrochætæ; legs yellow, spines black, tibia 1 densely spined to base, two stout spines at tip of femur 1; hind tibia of male curved; abdomen brown, the segments pale on tips. Wings uniformly pale yellowish, with yellowish veins and hair, tip of thyridial cell, and back to and lower anastomosis dark brown. In fore wings the discal cell is plainly longer than the pedicel, fork 1 nearly its width back on discal cell, fork 3 broad at base, lower median not fractured at base of fork 5; radius barely sinuate before stigma. Hind wings have forks 1 and 3. both more acute at base than in fore wings.

Expanse 40 mm.

From Pisgah Forest, N. Car., August. Resembles *Anisogamus divergens* Walk., but the male has not the black dorsal plate so characteristic of that species.

Anisogamus infernalis, n. sp. (Fig. 7).

Palpi brown, yellowish on base of the second joint; head yellowish, darker on vertex; antennæ yellowish; basal joint blackish beneath; posterior warts and pronotum with yellow hair, mesonotum with dark stripe each side, but tubercles in front of base of wings are pale, with golden hair; abdomen black, but pale on



NEW AMERICAN TRICHOPTERA

venter; legs pale yellowish, black on under side of first and second joints of tarsus I; spines black, and spurs yellowish. Leg I with very few spines, one at tip of femur, two or three on tibia, and small ones at tips of tarsal joints. Wings pale, the apical and posterior part brownish, with pale spots, larger pale spots beyond the anastomosis, anastomosis dark brown, membrane clothed with fine hairs. Costal area of fore wings rather broad, apical part hardly as long as in *A. disjunctus* and *A. costalis*, but venation about the same; the discal cell is hardly as long as the pedicel. Lower median only slightly fractured at base of fork 5; in the hind wings apical cells as in the fore wings.

Expanse 26 mm.

From Pinnacle Mt., Fulton Co., N. Y., 15th September (Alexander). It has shorter legs than *A. disjunctus* or *A. costalis*.

Anisogamus disjunctus, n. sp. (Fig. 22).

Yellowish; darker on head between ocelli and antennæ; mostly yellowish hair on head and prothorax, some black before base of wings; abdomen dark; wings nearly uniform pale yellowish, no markings, but a white hyaline spot on thyridium and also on arculus, membrane faintly roughened, clothed with sparse, fine, pale hair. Maxillary palpi with second and third joints in male subequal, each as long as space between eyes; in female palpi short, last joint not as long as basal joint of antennæ, fourth about one half of fifth, third about three-fourths of fifth joint, second hardly as long as third. Mesothoracic strips quite long, rather broader behind; posterior warts of vertex transversely elliptical and rather small. Legs with black spines and pale spurs, 1, 3, 4. Fore wings moderately long, rounded at tip; radius strongly bent at base of stigma, discal cell a little longer than pedicel, fork 1 its width back on discal cell, fork 3 a little back of anastomosis, its base not very broad, but not acute, lower median much disjointed at base of fork 5, in hind wings the apical cells are similar to those of fore wings, but fork 3 is more acute at base.

In both sexes the cheeks show a little blunt tubercle below.

Expanse 26 mm.

From Bon Accord, British Columbia, May and June (Russell).

(To be continued).

REPORT ON A COLLECTION OF JAPANESE CRANE-FLIES (*TIPULIDÆ, DIPTERA*).

(Continued from Vol. XLV., p. 322).

BY CHARLES P. ALEXANDER, ITHACA, N. Y.

Subfamily: *TIPULINÆ.*

Tribe: DOLICHOPEZINI.

Genus: **Nesopeza,** gen. n.

Antennæ 13-segmented, segment 1 cylindrical with a few long hairs; segment 2 oval-cylindrical; segment 3 very long, cylindrical; the succeeding segments gradually shorter, the last very slender. Palpi with the apical segment slender, as long as all of the preceding segments combined. Legs excessively long and slender. Wing-venation as in *Dolichopeza* Curtis (lack of cell 1st M_2, basal deflection of Cu_1 far before the fork of M, etc.), but the radial sector is very elongate, angulated at origin, almost as long as R_3 beyond the fork, Rs not short and simulating a cross-vein.

Type of the genus: *Dolichopeza gracilis*, de Meij.

Nesopeza gracilis de Meijere.

1911.—*Dolichopeza gracilis* de Meijere; Tijd. voor Ent., vol. 54, p. 60, 61; pl. 4, fig. 46.

One ♀ from Tokyo, Japan; August, 1912. (Vial D.)

This new genus represents one extreme of the *Dolichopeza* group and *Scamboneura* Osten Sacken, the other. In this genus the radial sector is extremely elongated, in *Dolichopeza* Curtis almost transverse and simulating a cross-vein, while in *Scamboneura* the origin of the sector is farther distad than the tip. See my key to the Dolichopezini, Psyche, vol. 19, p. 64. (April, 1912.)

Genus: **Dictenidia** Brullé.

Tribe: CTENOPHORINI.

Dictenidia fasciata Coquillett.

1898.—*Dictenidia fasciata* Coquillett; Proc. U. S. Nat. Mus., vol. 21, p. 304, 305.

1902.—*Dictenidia fasciata* Kertesz; Cat. Dipt., vol. 2, p. 266.

One ♂ from Tokyo, Japan, Aug. 1912 (Vial 39). It agrees very closely with Coquillett's description. The specimen offers the following measurements:

Length 12 mm.; wing 10.2 mm.; antennæ 5 mm.
Fore leg femur 6.7 mm.; tibia 7.4 mm.
Middle leg femur 7 mm; tibia 6.4 mm.; tarsus 6.9 mm.
Hind leg femur 8.8 mm.; tibia 10.4 mm.; tarsus 6 mm.

I supply a figure of the wing of this beautiful crane-fly, it never having been figured. (See Plate XII, fig. 8).*

Tribe: TIPULINI.

Genus: **Pachyrhina** Macquart.

Key to the Japanese Pachyrhinæ.

1. Thoracic markings brown or black, distinct.....2.
   Thoracic markings very pale, ill-defined.....*flavonota*, sp. n.
2. Mesonotal stripes pale brown; tip of wing narrowly and regularly bordered with dark brown; [scutellum and postnotum mostly yellowish; abdominal tergites trivittate].....*palloris* Coq.
   Mesonotal stripes black; tip of wing hyaline or irregularly suffused with darker.....3.
3. Mesonotal stripes very broad, almost concealing the pale ground colour; tip of the wing clouded with darker.....*pullata*, sp. n.
   Mesonotal stripes narrower, so that the yellow ground colour is well defined; tip of the wing clear.....4.
4. Scutellum and postnotum unmarked with darker.....*repanda*, sp. n.
   Scutellum black; postnotum with a dark median vitta.....*virgata* Coq.

Pachyrhina flavonota, sp. n.

Head yellow, shining, without a distinct darker spot; mesonotum orange-yellow with well defined darker stripes.

Male.—Length 12 mm.; wing 10.6 mm.; antennæ 3.8 mm.

Female.—Length 14.6 mm.; wing 14 mm.

Male.—Palpi light brown; frontal prolongation of the head yellow, nasus brown, with a tuft of brown hairs; antennæ, scapal segments yellow, first flagellar segment yellow, on its inner face at three-fourths its length with a wart-like knob, remaining flagellar segments brown, the enlarged bases darker brown, inner face of the

*Plate XII will appear in the next issue.

intermediate flagellar segments not very deeply incised; front, vertex and occiput shining yellow, no distinct mark on the vertex.

Pronotum yellowish; mesonotal præscutum orange-yellow with faint indications of darker stripes; a small brown mark in the notch of the transverse suture; scutum, scutellum and postnotum without distinct marks. Pleura light yellow. Halteres brownish yellow, the knobs yellow. Legs, coxæ and trochanters yellow, femora and tibiæ dull yellow, the tips darker, tarsi brown. Wings subhyaline, the tip broadly but indistinctly suffused with darker; stigma oval, brown; cells C and Sc. a little yellowish. Venation, see pl. XI. fig. 5.

Abdomen with the tergites yellowish, slightly darker medially and laterally; segments 8 and 9 brown; sternites yellowish. The male hypopygium with the 9th tergite from above (plate XI, fig. 6) with the caudal margin four-lobed, the central lobes on either side of the shallow median notch, these lobes provided with numerous black denticulæ; the 9th sternite from below with a broad and deep V-shaped median notch. Outer apical appendages narrow, tapering to a very long point; inner appendage with the usual cephalad prolongation, beneath which is a small, chitinized tooth. (See plate XI, fig. 15.)

Female.—Larger, the abdominal tergites with distinct brown blotches on each segment, these broadest behind, narrowed to a point in the front.

Holotype, ♂, Tokyo, Japan, August, 1912 (Vial K).

Allotype, ♀, Tokyo, Japan, August, 1912 (Vial 42).

Pachyrhina palloris Coquillett.

1898.—*Pachyrhina palloris* Coquillett, Proc. U. S. Nat. Mus., vol. 21, p. 306.

1902.—*P. palloris* Kertesz, Cat. Dipt., vol. 2, p. 321.

1910.—*P. palloris* Riedel, Deutsch. Ent. Zeitschr., p. 436.

Two females agreeing rather well with Coquillett's description, but showing the following differences: The median thoracic vitta is bisected from the front by a pale line, making this stripe double; sides of the scutellum brown; the antennæ, broken in the type, may be thus described : four basal segments yellow, remaining

segments with the enlarged basal third dark brownish black, the remainder of each segment dull yellow. The venation is shown in plate XI, figure 2. Vial K. Tokyo, Japan; August, 1912; 2 ♀.

Pachyrhina pullata, sp. n.

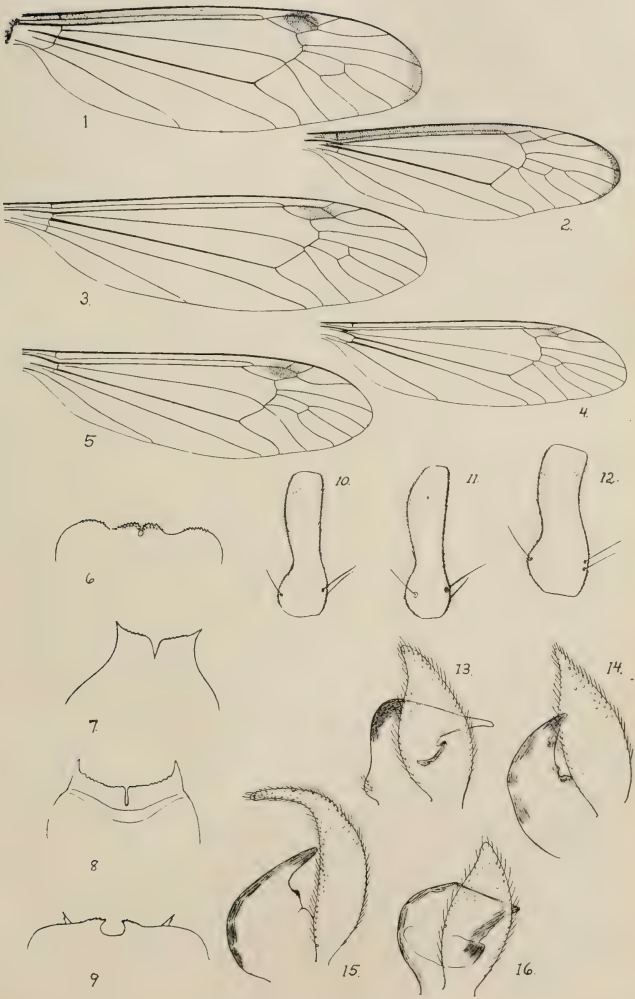
Thoracic dorsum mostly black; wings with the apex brownish.

Male.—Length 17.4 mm.; wing 12.9 mm.; antennæ 4.6 mm.

Male.—Palpi brown, the third segment yellow; frontal prolongation of the head shiny black; antennæ with the first segment brown, paler apically, second segment yellow, third segment pale brown at the base, dark brown at tip, remaining segments dark brownish black. (See plate XI, fig. 12, for outline of the sixth antennal segment); vertex brownish yellow, darkening to the brown on the occiput and genæ.

Pronotum light yellow above; mesonotum dull yellow with three jet black stripes, the median stripe very broad and narrowed behind, the lateral stripes short, broad, straight, the space between these three stripes very narrow and greatly reduced; scutum with the median depression pale in front; behind and on the lobes black; scutellum and postnotum broadly black medially, paler on the lateral margin of the sclerites. Pleura yellow, with dark brownish black blotches as follows: An elongate, vertical mark on the propleura; mesopleura with a large blotch on the ventral portions of the episternum and the sternum; caudal edge of these two sclerites with an elongate vertical blotch extending from the wing-root to mesocoxa, the portion of the postnotum between the base of the wings and the halteres brown; metepimeron brown. Halteres pale, knobs whitish at the tips. Legs, fore coxae brown, trochanter light yellow, femora yellow basally, browner at tip; other coxæ more yellowish, femora darkening to brown at tip, tibiæ brown, lighter basally; tarsi dark brownish-black. Wings hyaline or nearly so, cells C and Sc. yellowish; stigma brown, distinct; cord margined with brown; apex of wing brownish. Venation as in plate XI, fig. 1.

Abdomen with the first tergite brown, except on the side in front; segments 2 to 5 brown on the caudal half; segment 6 with the caudal half dark brown; segments 7 to 9 dark brown; sternites yellow; caudal half of the 7th to 9th segments dark brown.



JAPANESE CRANE-FLIES

Male.—Hypopygium, with the 9th tergite (pl. XI, fig. 7) from above, narrow with deep median notch on the caudal margin, and with the outer angles of the lobes produced into sharp points, which are directed caudad and laterad, the caudal margin of these lobes with fine denticulæ, 9th sternite from beneath with the caudal margin gently concave, pleural suture very strongly arcuated; apical appendages, outer one rather broad and pointed, inner appendage with a long curved point below which are three chitinized teeth. (See plate XI, fig. 14).

Holotype, ♂. Tokyo, Japan; May 7, 1912. (Vial 30.)

Pachyrhina repanda, sp. n.

Head yellow, with a small rounded brown spot on vertex; mesothorax with black stripes, scutellum and postnotum unmarked.

Male.—Length 12.9 mm.; wing 13.4 mm.; antennæ 5.2 mm.

Male.—Palpi yellow; frontal prolongation of the head yellow except the nasus, which is brownish and provided with a tuft of long brown hairs; antennæ with segments 1 to 3 yellowish, the third a little brown on the lower surface; remainder of antennæ dark brownish black; the intermediate flagellar segments rather deeply incised on the lower face at the basal third (see plate XI, figure 11, showing the outline of the sixth antennal segment); front, vertex and occiput yellow, the vertex with a small rounded dark brown median spot behind.

Pronotum light yellow; mesonotal præscutum light yellow, with dark brownish black stripes as follows: A broad median stripe which is widest in front, slightly narrowed behind and running the length of the sclerite; a shorter lateral stripe on either side, this stripe curved laterad before the pseudosuture; scutum, lobes with a prominent oblique stripe running across them; a small triangular median blotch on the anterior half of the sclerite; scutellum and postnotum light yellow, unmarked. Pleura pale yellowish white. Halteres light coloured, the knob a little suffused with brown. Legs, coxæ and trochanters light yellow, femora and tibiæ yellowish brown, passing into brown at the tip of the latter; tarsi brown. Wings subhyaline, cells C and Sc. a little brighter, yellowish; stigma small, brown, tip of the wing a little suffused with darker; veins brown, vein Sc. yellow. Venation as in plate XI, figure 3.

Abdomen, tergites yellow with an indistinct light brown blotch in the middle of each sclerite; lateral sutures darker; sternites yellow; segments 7 to 9 dark brown. Male hypopygium with the 9th tergite (see plate XI, fig. 8) from above with the caudal margin concave, with a deep, parallel-sided, median notch, the lateral angles produced into points which are directed caudad the caudal margin with small, black denticulæ and points; 9th sternite from below with the caudal margin about straight with a rounded median protuberence. Apical appendages, the outer fleshy lobe rather broad, the point moderately long and rather obtuse; the inner appendage is strongly chitinized, rounded-oval, on the cephalic face produced into a long point which is directed forward; below this point, very strongly chitinized and deeply incised. (See plate XI, fig. 16.)

Holotype, ♂, Tokyo, Japan; August, 1912. (Vial 43.)

Pachyrhina virgata Coquillett.

1898.—*Pachyrhina virgata* Coquillett, Proc. U. S. Nat. Mus., vol. 21, p. 306.

1902.—*P. virgata* Kertesz, Cat. Dipt., vol. 2, p. 325.

1910.—*P. virgata* Riedel, Deutsch. Ent. Zeitschr., p. 436.

Several specimens of this interesting species were included in the collection.

Male.—Length 10.8—11.8 mm.; wing 10.2—12.4 mm.; antennæ 4.6—4.9 mm.

Female.—Length 14.4 mm.; wing 13 mm.

I give a figure of the sixth antennal segment in plate XI, figure 10, and of the wing-venation in plate XI, figure 4. The male hypopygium may be described as follows: The 9th tergite from above (plate XI, figure 9) with the caudal margin having a broad rounded median notch into which the tips of the apical pleural appendages fit, the inner edge of the adjacent lobe produced into chitinized lobules which are provided with denticulæ; each lobule with a sharp chitinized point on its caudal margin, these points directed caudad. In a small ♂ (Vial 46) the median notch is not so rounded, more oval, the sharp caudal points are longer. Apical appendages, the outer fleshy lobe rather broad and pointed, inner lobe with a

long, cephalad-directed point which is provided with a few hairs on its lower face, with a deep notch beneath its base and a strongly chitinized protuberence. (See plate XI, fig. 13).

Vial 22; Tokyo, Japan; April 26, 1912; 1 ♂, 1 ♀.
Vial 35; Tokyo, Japan; May 7, 1912; 1 ♀.
Vial 43; Tokyo, Japan; Aug. 1912; 2 ♂.
Vial 44; Tokyo, Japan; Aug. 1912; 1 ♀.
Vial 46; Tokyo, Japan; Aug. 1912; 2 ♂.
Vial K; Tokyo, Japan; Aug. 1912; 1 ♀.

(To be continued.)

THE PRESENCE OF RING-JOINTS IN AUSTRALIAN *SCELIONIDÆ*.

BY ALAN P. DODD, NELSON, N. Q., AUSTRALIA.

Quite recently while examining the antennæ of a Scelionid, *Gryonella reticulata* Dodd, I was somewhat surprised to find that two small ring-joints were present. As ring-joints have not been recorded in this family, I had never searched for them, and it was only accidentally that their presence in this species was noticed. This discovery caused me to examine the antennæ of numerous Scelionids in my collection. I found that in some cases there were obviously no ring-joints present; in others there appeared to be minute ring-joints, but I could not make sure of the fact, while in a few cases the ring-joints were distinct, though small. The following species possesssed obvious ring-joints: Subfamily *Teleasinæ*, *Gryonella reticulata* Dodd; Subfamily *Balinæ*, *Acolomorpha minuta* Dodd; Subfamily *Scelioninæ*, *Hadronotus nigriceps* Dodd, *Opisthacantha giraulti* Dodd, *Sceliacanthella paroipennis* Dodd, *Lcptoteleia aurea* Dodd, *Baryconus exsertus* Dodd, *B. longipennis* Dodd, and *B. trispinosus* Dodd.

The species, *Opisthacantha giraulti*, possessed apparently one ring-joint, but under high-power magnification there appeared to be three excessively thin ring-joints. *Gryonella reticulata* had two ring-joints, while the other species mentioned possessed but one each. This discovery is of considerable interest.

NEW AND LITTLE KNOWN SPECIES OF APHIDIDÆ.

BY JOHN J. DAVIS, BUREAU OF ENTOMOLOGY, WASHINGTON, D. C.

(Continued from Page 134.)

Rhopalosiphum howardii (Wilson).

This species has been collected by us from widely separated localities, and in all cases we have found it on the flower heads of the host plants. Mr. H. F. Wilson first described this species as *Amphorophora howardii* from the heads of *Panicularia nervata* at Batesburg. Mr. Geo. G. Ainslie found it on timothy heads, June 28, 1908, at Biltmore, N.C., Mr. R.A. Vickery collected it on *Elymus virginicus*, June 19, 1909, at Salisbury, N.C., Mr. C. N. Ainslie found it on heads of *Elymus*, August 11, 1911, at Salt Lake City, Utah; and the writer has collected it on the following plants and at the following localities: La Fayette, Ind., on heads of *Elymus canadensis*, orchard grass (*Dactylis glomerata*), and wheat, from July to October, inclusive; at Bedford, Ind., on *Elymus canadensis* and *E. striatus*, August 13, 1911; at Urbana, Ill., on *E. canadensis*, July 27, 1912; Lancaster, Wis., on *E. canadensis*, and cultivated barley, July 11, 1912; at Farley, Iowa, on *E. canadensis*, August 30, 1912; at Winner and Elk Point, S. Dak., on *E. canadensis*, September 2 and 5, respectively, 1912; and at Beaver Dam, Wis., on *E. canadensis*, September 11, 1912. During August, September, and October, the winged males were not uncommon, and these took flight within a few days after becoming winged. Although careful search was made, we were unable to find oviparous females. It appears from our present meagre data that the winged males and winged viviparous females migrate to an unknown host in the fall of the year, where the oviparous females are produced, as is also probably the case with *Myzus lycopersici* (Clarke).

Wingless viviparous females.

(Pl. VII, fig. 34.)

Entire body nearest to cadmium yellow as given in Smith's colour chart, but not so bright, the colour varying to brownish cadmium yellow; head and thorax paler, with a slight greenish tint. Antennæ blackish, excepting segments I, II, and entire base of III, which are dusky greenish (in recently matured individuals III, basal three-fourths of IV, and extreme base of V are brownish);

segments III and filament of VI subequal; total length very little more than half the body length and not reaching to base of cornicles; segment III as well as IV lacking sensoria, the usual distal ones being present on segments V and base of VI. Eyes blackish, ocelli absent. Legs with femora pale brown, the tibiæ and tarsi black. Cornicles black and shaped as in the winged female. Style pale yellowish to brownish yellow, otherwise as in winged female.

Measurements from 8 specimens in balsam as follows: Length of body, not including cauda, 1.65 to 2.05 mm, average 1.80 mm.; length to tip of cauda 1.78 to 2.16 mm., average 1.93 mm.; width of body 0.97 to 1.08 mm., average 1.00 mm.; length of cornicle 0.43 to 0.49 mm., average 0.45 mm.; length of cauda 0.16 to 0.19 mm., average 0.18 mm. Antennal measurements as follows:

Locality, date, etc.	I. mm.	II. mm.	III. mm.	IV. mm.	V. mm.	VI. (base) mm.	VI. (fil.) mm.	Total mm.
La Fayette, Ind., Wheat, July 17, 1912	.....	.....	0.313	0.191	0.174	0.113	0.313	.....
Urbana, Ill., Elymus, July 27, 1912	.....	.....	.322	.157	.157	.104	.348	.....
Urbana, Ill., Elymus, July 27, 1912	.....	.....	.296	.157	.148	.104	.348	.....
La Fayette, Ind., Elymus, Aug. 14, 1911	0.087	0.061	.330	.209	.191	113.	.330	1.321
La Fayette, Ind., Elymus, Aug. 14, 1911	.087	.061	.322	.217	.191	.113	.330	1.321
La Fayette, Ind., Elymus, Sept. 4, 1911	.087	.061	.348	.226	.182	.104	.348	1.356
La Fayette, Ind., Elymus, Sept. 4, 1911	.087	.061	.356	.226	.182	.....	.....	.....
Elk Point, S. Dak., Elymus, Sept. 5, 1912	.087	.069	.417	.278	.243	.122	.400	1.616
Elk Point, S. Dak., Elymus, Sept. 5, 1912	.087	.069	.417	.296	.243	.122	.417	1.651
Winner, S. Dak., Elymus, Sept. 2, 1912	.....	.....	.313	.252	.209	.104	.348	.....
Winner, S. Dak., Elymus, Sept. 2, 1912	.087	.061	.348	.235	.226	.104	.383	1.444
Lancaster, Wis., Barley, July 11, 1912	.....	.....	.330	.209	.174	.122	.348	.....
Lancaster, Wis., Barley, July 11, 1912	.....	.....	.339	.191	.165	.104	.339	.....
Beaver Dam, Wis., Elymus, Sept. 11, 1912	.087	.069	.556		.217	.122	.408	1.459
Beaver Dam, Wis., Elymus, Sept. 11, 1912	.087	.069	.400	.287	.226	.113	.400	1.542

Winged viviparous female.

(Pl. VII, figs. 35–39).

Head dark brown. Antennæ black, excepting basal half of I and ring at extreme base of III, which parts are pale, and sometimes all of I and II are pale dusky; segment VII the longest; not reaching to tip of body; 2 to 10 circular sensoria in a row, usually near base, on segment III, and the usual distal ones on V and base of VI. Eyes reddish black, ocelli black. Beak barely reaching to coxæ of the second pair of legs. Thoracic plates shining dark brown. Wing veins blackish and conspicuous, the venation as illustrated. Legs with femora pale, excepting the hind pair, which are dusky to black; the tibiæ and tarsi black. Abdomen usually brownish yellow, but sometimes with a distinct pale green tint, and bearing three dusky spots on each side anterior to the cornicles; also the dorsum of each segment with a more or less distinct dusky transverse band. Cornicles black, a little longer than segment IV of the antennæ, and reaching about to tip of cauda, clavate in shape. Cauda pale greenish yellow, semi-ensiform and sparsely hairy.

Measurements, taken from 10 specimens mounted in balsam, as follows: Length of body, not including cauda, 1.35 to 1.74 mm., average 1.51 mm.; length of body to tip of cauda 1.47 to 1.90 mm., average 1.64 mm.; width of body 0.55 to 0.74 mm., average 0.65 mm.; length of wing 2.40 to 2.94 mm., average 2.67 mm.; width of wing 0.85 to 1.08 mm., average 0.93 mm.; cornicles 0.33 to 0.38 mm., average 0.35 mm; cauda 0.156 to 0.191 mm., average 0.173 mm. Antennal measurements as follows:

Locality, date, etc.	I.	II.	III.	IV.	V.	VI. (base)	VI. (fil.)	Total	No. sens. on III.
Salisbury, N. C. Elymus, R. A. Vickery	0.080	0.060	0.383	0.278	0.226	0.139	0.556	1.722	4
Salisbury, N. C., Elymus, R. A. Vickery	.080	.060	.383	.261	.243	.130	.556	1.713	2
Salisbury, N. C., Elymus, R. A. Vickery	....	....	.417	.313	.304	.139	.609	....	5
Salisbury, N. C., Elymus, R. A. Vickery	....	....	.417	.330	.304	.156	.574	....	5
La Fayette, Ind., Dactylis, July 17, 1912	.090	.070	.470	.348	.278	.139	.478	1.873	8
La Fayette, Ind., wheat, July 17, 1912	....	....	.400	.296	.226	.139	.461	....	9

Locality, date, etc.	I.	II.	III.	IV.	V.	VI. (base)	VI. (fil.)	Total	No. sens. on III.
La Fayette, Ind., wheat, July 17, 1912	.090	.069	.408	.278	.226	.139	.470	1.671	10
Lancaster, Wis., barley, July 10, 1912	....	....	.435	.296	.243	....	....	....	5
Lancaster, Wis., barley, July 10, 1912	....	....	.426	.313	.261	.139	.556	....	....
Urbana, Ill., Elymus, July 27, 1912	.080	.070	.435	.330	.261	.148	.478	1.802	7
Urbana, Ill., Elymus, July 27, 1912	....	....	.417	.348	.278	.139	.522	....	7
Bedford, Ind., Elymus, Aug. 13, 1911	.080	.060	.365	.269	.235	.122	.487	1.618	4
La Fayette, Ind., Elymus, Sept. 6, 1911	.080	.069	.417	.296	.243	.122	.435	1.653	3
La Fayette, Ind., Elymus, Sept. 6, 1911	.080	.060	.391	.296	.252	.122	.452	1.653	3
Elk Point, S. Dak., Elymus, Sept. 5, 1912	.080	.060	.470	.313	.261	.139	.522	1.845	7
Elk Point, S. Dak., Elymus, Sept. 5, 1912	.090	.070	.487	.330	.252	....	....	....	6
La Fayatte, Ind., wheat, July 17, 1912	....	....	.435	.296	.243	.139	.522	....	9
La Fayette, Ind., wheat, July 17, 1912	.080	.069	.435	.313	.252	.139	.539	1.818	8

Winged male.

(Pl. VII, fig. 40.)

Head blackish. Antennæ black; segment III longest, reaching a little beyond tip of body; segment III with 39 to 55 irregularly placed, moderately tuberculate, circular sensoria, segment IV with from 18 to 23, segment V with from 6 to 9, not including the usual distal one, and segment VI (base) with the usual distal sensoria. Thorax blackish. Wings as in the viviparous form. Legs blackish, excepting the base of femora. Abdomen dull green, with black transverse bands on the first three abdominal segments, and three rather large black spots on each side anterior to the cornicles; also a few scattered black markings on the abdomen, evidently traces of transverse bands. Cornicles black, clavate, reaching about to tip of cauda. Cauda concolorous with abdomen and conical in shape.

Average measurements from 3 specimens mounted in balsam, as follows: Length of body, not including cauda, 1.68 mm.; length to tip of cauda 1.79 mm., width 0.83 mm.; length of wing 3.12 mm.,

width 1.16 mm.; cornicles 0.77 mm.; cauda 0.31 mm. Antennal measurements as follows:

	mm.	mm.	mm.	mm.	mm.	mm.	mm.	mm.
La Fayette, Ind., Elymus, Oct. 10, 1911	0.087	0.070	0.504	0.400	0.313	0.130	0.678	2.182
La Fayette, Ind., Elymus, Oct. 10, 1911	.087	.070	.487	.383	.313	.130	.....	.....
La Fayette, Ind., Elymus, Oct. 10, 1911	.089	.070	.504	.400	.304	.139	.652	2.149
La Fayette, Ind., Elymus, Oct. 10, 1911	.087	.070	.504	.383	.322	.130	.661	2.157
Farley, Iowa, Elymus, Aug. 30, 1912	.087	.070	.539	.383	.304	.156	.539	2.078
Farley, Iowa, Elymus, Aug. 30, 1912	.....	.....	.539	.383	.330	.139	.591	.....

Eulachnus rileyi (Williams) *

This species is very closely related to *Eulachnus agilis* Kalt., both in form and in its habits, but differs from that species as described by G. Del Guercio by lacking sensoria on antennal segment III of the winged viviparous female. Del Guercio does not refer to the sensoria in his description, but in his figure on Plate XVII (fig. 227)* he shows the antennæ of the winged viviparous female of *E. agilis* to bear 8 sensoria on segment III, 3 sensoria segment IV, 2 sensoria on segment V, and the usual ones on segment VI.

Wingless viviparous female.
(Pl. VII, fig. 41.)

Head dusky brown; the prothorax likewise dusky, with a paler median dorsal line; remainder of body varying in colour from orange brown to nearly black or greenish black, usually the former; a longitudinal row of black dots on each side of the dorsal median and another row of similar dots lateral of this, each dot bearing a long spine-like hair; in life the body is usually covered with a pulverulence, giving the insect a hoary appearance and usually obscuring all markings. Antennæ, head, legs, and cauda, as well as the body, bearing numerous conspicuous, long, black, spine-like hairs. Antennæ dark brownish to blackish, excepting basal halves of IV and V, and extreme base of VI, which are paler; segment III longest; total length about one-half that of the body; segment IV·

*This species has not been positively identified, since the type specimens are not available. The male of our species agrees well with the winged form as described by Williams for *L. rileyi* and the identification as here recorded is probably correct.

bearing a small distal sensorium, segment V a large distal sensorium, and segment VI one larger and two or three smaller ones near by. Eyes black. The hind pair of legs entirely blackish, except the basal ends of femora, which are paler; the two fore pairs of legs brownish, excepting tarsi, which are black. Cornicles represented by a black circle. Cauda broadly rounded and typical of the genus.

Average measurements for 6 specimens in balsam as follows: Length of body 2.13 mm., width 0.66 mm.; length of middle tibia 0.81 mm.; hind tibia 1.43 mm.; length of first tarsal segment of hind tibia 0.113 mm., of second tarsal segment 0.217 mm. Antennal lengths as follows:

Locality, date, etc.	I. mm.	II. mm.	III. mm.	IV. mm.	V. mm.	VI. mm.	Total mm.
St. Louis, Mo., July 25, 1911.....	0.078	0.087	0.400	0.209	0.243	0.191	1.208
St. Louis, Mo., July 25, 1911.....	.087	.087	.391	.209	.243	.191	1.208
Chicago, Ill., July 20, 1910.....	.087	.087	.400	.243	.252	.191	1.260
Chicago, Ill., July 20, 1910.....	.087	.087	.400	.226	.261	.191	1.252
Chicago, Ill., July 20, 1910.....	.087	.087	.374	.226	.269	.200	1.243
Chicago, Ill., July 20, 1910.....	.087	.087	.383	.209	.269	.191	1.226
Chicago, Ill., July 20, 1910.....	.087	.087	.356	.226	.243	.209	1.208
Chicago, Ill., July 20, 1910.....	.087	.087	.356	.217	.252	.200	1.199
Chicago, Ill., July 20, 1910.....	.078	.087	.356	.235	.269	.191	1.216
Chicago, Ill., July 20, 1910.....	.078	.087	.374	.243	.269	.182	1.233
St. Louis, Mo., Oct. 6, 1910, J. T. Monell.....	.087	.087	.452	.269	.278	.217	1.390

Winged viviparous female.

(Pl. VII, figs. 42–46.)

Entire body covered with a conspicuous white flocculence, beneath which the head and thorax are of a brownish colour and the abdomen a greenish brown to ochreous brown, more often the latter; abdomen with a row of inconspicuous setiferous dots, one on each side of the median line. Legs, antennæ and front of head bearing prominent spine-like hairs as in the wingless form; the cauda and tip of abdomen bearing many rather long hairs. Antennæ blackish, excepting basal half of III, which is pale brown; a little more than half the body length; segment III longest; sensoria as in the wingless forms. Eyes black. Hind legs blackish, excepting basal ends of femora; two fore pairs of legs similarly coloured

excepting tibiæ, which are pale at extremities. Wings as in illustration, the media usually one-branched, although this character is variable, Mr. Monell has collected specimens of this species in St. Louis which had the media unbranched, and he also collected one individual with a bifurcate media. Regarding this variable venation Mr. Monell wrote Dr. H. Schouteden, who replied under date of April 23, 1905, as follows: "A Lachnus with cubital vein unforked is quite unknown to me, but there are some species with only one fork (*L. agilis*)." Cornicles and cauda as in wingless form.

Average measurements from 3 specimens in balsam as follows- Length of body 2 mm., width 0.50 mm.; length of wing 2.2 mm., width 0.70 mm.; length of middle tibia 0.79 mm., of hind tibia 1.62 mm.; length of first tarsal segment 0.113 mm., of second tarsal segment 0.209 mm.

Antennal measurements as follows:

Locality and Date	I. mm.	II. mm.	III. mm.	IV. mm.	V. mm.	VI. mm.	Total mm.
St. Louis, Mo., July 25, 1911.....	0.070	0.078	0.435	0.235	0.243	0.191	1.252
St. Louis, Mo., July 25, 1911.....	.078	.078	.443	.243	.261	.191	1.294
St. Louis, Mo., July 25, 1911.....	.078	.087	.426	.261	.287	.209	1.348
St. Louis, Mo., July 25, 1911.....	.078	.087	.469	.269	.269	.209	1.381
Chicago, Ill., July, 20 1910.....	.078	.087	.400	.243	.261	.191	1.260

Winged Male.
(Pl. VII, fig. 47).

Head and thorax black; abdomen pale brownish, with a dull orange tint, and the entire body covered with a white pulverulence. Antennæ black, reaching nearly to tip of body; segment III longest; segment III with 60 to 84 faintly tuberculate, circular sensoria, IV with 22 to 41, V with 10 to 29, not including the usual large distal sensorium, and segment VI with 3 to 5, not including the usual large sensorium. Eyes black. Wings as in the viviparous female. Legs black, excepting the pale extreme bases of femora and the brownish basal halves of tibiæ. Cornicles and cauda as in other forms, the anal plate dusky.

Average measurements from six individuals in balsam as follows: Length of body 1.59 mm., width 0.47 mm.; length of wing 2.61 mm., width 0.83 mm. Antennal measurements as follows:

Locality and Date	Measurements I mm.	II mm.	III mm.	IV mm.	V mm.	VI mm.	Total mm.	No. of sensoria III	IV	V*	VI*
St. Louis, Mo., Oct. 1, 1910	0.078	0.087	0.617	0.382	0.417	0.243	1.824	75	25	17	3
St. Louis, Mo., Oct. 1, 1910	.078	.087	.635	.400	.417	.261	1.878	81	33	18	5
St. Louis, Mo., Oct. 1, 1910	.078	.087	.522	.304	.313	.217	1.521	72	24	19	3
St. Louis, Mo., Oct. 1, 1910	.078	.087	.548	.313	.313	....	....	65	22	20	.
Morgan Park, Ill., Sept. 22, 1908	.078	.087	.582	.365	.391	.261	1.764	83	28	20	4
Morgan Park, Ill., Sept. 22, 1908	.078	.087	.565	.400	.400	.252	1.782	..	..	..	..
St. Louis, Oct. 6, 1910 J. T. Monell	.078	.087	.591	.374	.382	.226	1.738	72	32	17	4
St. Louis, Mo., Oct. 6, 1910, J. T. Monell	.087	.087	.609	.365	.374	.235	1.757	83	31	16	5
St. Louis, Mo., Oct. 24, 1909	.078	.087	.556	.356	.348	.243	1.668	72	30	10	4
St. Louis, Mo., Oct. 24, 1909	.078	.087	.574	.348	.339	.235	1.661	60	27	13	..
La Fayette, Ind., Oct 23, 1912	.087	.087	.661	.382	.452	.261	1.930	83	34	29	4
La Fayette, Ind., Oct. 23, 1912	.087	.087	.661	.391	.435	.278	1.939	84	41	16	4

*Not including the large sensorium.

Wingless oviparous female.
(Pl. VII, fig. 48.).

Body ochreous brown and covered with many small blackish dots, each giving rise to a spinelike hair; head and thorax with dusky longitudinal bands on each side of the median line; the entire body covered with a fine pulverulence. Antennæ dusky to blackish, segment IV being slightly paler at base; relative length of segments about as in other forms; less than half the body length; sensoria as in wingless viviparous female. Eyes black. Legs blackish, excepting bases of femora, which are paler; hind tibiæ swollen and bearing about 65 circular sensoria. (An occasional oviparous female has been observed which bore no visible sensoria on hind tibiæ, although the latter are always swollen.) Anal plate dusky.

Average measurements from 5 specimens in balsam as follows: Length of body 2.55 mm., width 0.85 mm. Antennal measurements as follows:

Locality and Date	I. mm.	II. mm.	III. mm.	IV. mm.	V. mm.	VI. mm.	Total mm.
Morgan Park, Ill., Sept. 22, 1908...	.087	0.096	0.417	0.261	0.296	0.226	1.383
Morgan Park, Ill., Sept. 22, 1908...	.087	.087	.417	.261	.278	.209	1.339
Chicago, Ill., Oct. 15, 1909.....	.087	.087	.408	.261	.287	.199	1.329
Chicago, Ill., Oct. 15, 1909.....	.087	.087	.426	.252	.296	.217	1.365
St. Louis, Mo., Oct. 24, 1909.....	.087	.096	.417	.252	.269	.209	1.330
St. Louis, Mo., Oct. 24, 1909.....	.087	.087	.400	.261	.261	.217	1.313
St. Louis, Mo., Oct. 24, 1909.....	.087	.096	.426	.226	.261	.199	1.295
St. Louis, Mo., Oct. 24, 1909.....	.087	.087	.400	.209	.261	.199	1.243
La Fayette, Ind., Oct. 23, 1912.....	.087	.096	.435	.252	.252	.199	1.321
La Fayette, Ind., Oct. 23, 1912.....	.087	.087	.452	.234	.243	.217	1.320

Fig. 18

Egg.—(Fig. 18.)

When first laid, the egg is a pale yellowish brown, later changing to ochreous brown, and finally to jet black. It measures 0.65 by 0.30 mm. This insect lives upon the pine throughout the summer, and the winter eggs are deposited on the blackish leaf sheath at base of leaves of the same plant.

Outside of Nebraska, the type locality of *Eulachnus rileyi*, this species has been reported from Albany, N. Y., under the name *Lachnus agilis* Kalt., by Prof. C. P. Gillette.* The writer has collected it on the Austrian or black pine (*Pinus austriaca*) at Chicago, Morgan Park, and Urbana, Ill.; Independence, Iowa; La Fayette, Ind., and, in company with Mr. Monell, at St. Louis, Mo. Mr. Monell has specimens in his cabinet collected by Mr. Theo. Pergande in 1882 and 1885 at Washington, D. C., on the Jersey or scrub pine (*Pinus inops*), and he has himself collected it at various times since 1905 at St. Louis, Mo., on *Pinus austriaca*.

(To be continued.)

*Plant louse notes, Family Aphididæ. Journ. Econ. Ent., vol 2, No. 6, pp. 385-388, 1909.

NOTES ON *RHABDOCNEMIS OBSCURUS* BOISD. IN AUSTRALIA.*

BY A. A. GIRAULT, NELSON, N.Q., AUSTRALIA.

During July, 1912, this species was reported to be injuring sugar cane at Innisfail (Darradgee, Goondi and Mundoo), North Queensland. Upon visiting the area during the last week of the month, the reports were found to be true and active measures were being taken by the farmers to combat the insect. Injured cane was first noticed on the trucks at the Goondi Mill, where about one or two per cent of the bottom ends of the cut cane were observed to bear borer channels. Later, after exploring rapidly the whole area, the insect was found to be most common at Darradgee, common at Goondi, but none were found at Mundoo nor East Innisfail. The farmers were using baits made of halved pieces of cane, the inner side of each half stick sometimes smeared with molasses and a half a dozen or so laid face down upon the ground in a row upon a small, clean area. The baits were placed only around one or two edges of a field; a large number of them were examined during the week, with the result that no beetles were found as a general rule with the exception of the worst fields, where on the average a dozen were taken from each trap (day: these fields had been trapped and collected for several weeks previously). Badila was the variety infested, since I saw but little injury to others (mostly Singapore); the former is softer, having less fibre. Exploration of cane fields—in the trash left after cutting, under logs, around the edges of cane fields, in nearby jungles, on banana trees and so forth—resulted in finding the beetle only in the living cane plants, where they were hiding (daytime) under the sheaths of the lowest *green* leaves upon which they feed by gouging out short, longitudinal channels from the inner surface. Sometimes they were hiding under the lower (dead) leaf-sheaths, and, as stated, under the traps. Rarely, a beetle was found on the ground or out of the fields entirely. None were seen at lights at night. They were sluggish at all times and none were observed flying (day); when disturbed they would generally assume a feigning attitude, remaining inert. The edges of the field, apparently, were most

* Contribution No. 8, Ent. Laboratory, Bureau of Sugar Experiment Stations, Bundaburg, Q.

infested, but sometimes the insect was distributed over an entire field.

There were no external indications of the presence of the borer in the fields, excepting that infested plants were weakened somewhat, and therefore very likely to be broken off by the wind; weakened and diseased plants were found to be infested more frequently than others. In canes which had been broken off by a cyclone, several months previously, when infested, there was sometimes a minute discoloured spot indicating the position of a large larva; these canes were infested near their tops and were only about three feet high and bare of leaves.

All stages of development were present. As a rule, only one or two of the beetles were found hiding in the same place; once four were found together and quite frequently pairs, but these were not mating, though in the mating position.

The farmers in the Goondi area had combined tolerably well and were using, as stated, the cane baits recommended by the Hawaiian entomologists; at the time, which was just before harvest, it seemed to me that one thorough search of the worst fields by hand, collecting the beetles and then, after harvest, burning the trash, would destroy the majority of those remaining, while the larvæ in the cane would be destroyed by the milling process. Mr. Robert Davis, of Darradgee, whom I quote later, brought to me some small pieces of infested cane taken from the remains of the trash on his field which had just been burnt in my presence. From these pieces were obtained three larvæ, two pupæ and three adults, and all proved to be dead except one pupa; later, the latter died; these specimen were taken from the interior of the pieces of infested cane, the pupæ and adults from cocoons. They appeared to have been steamed to death. From Mr. Davis I received the following interesting account:

"*Notes in Connection with Cane Borer Pest.*

"I first discovered Borer in or about April, 1912, in two shoots of cane while cutting cane for plants, after the field had been broken down by a recent cyclone. I made several enquiries about them from older farmers and was told that they were harmless, as they had been present on the (Johnstone) river for years past.

From April to the end of June I saw very few traces of them, owing to the heavy rainfall washing the ground. About the end of June they were found in many places, and because of enquiries I started to use baits composed of short pieces of cane split down the centre and laid flat on the headlands at about one quarter of a chain apart. In the meantime, I cleaned up all broken cane and cane tops from places where trees had fallen over on to the field, for in such places I found that the beetle bred more there; they were much worse in broken cane than in that standing. Cane broken and lying on the ground to rot is infested far worse than standing cane. The borer is also fond of hiding behind top leaves of standing cane and feeding on inside of leaf. During my clean-up I should say that we caught about two quarts of beetles and grubs; the second day caught some three quarts; the third day only a quart; the daily catch for the next week was about fifty borers a day. Since then the catch has been lessening, some days very few being caught. I also noticed that the damage was very much less on the headlands.

I have found old borers in last year's cane, left on the ground; also in cane that had been burnt last year. The borer works in the centre of the field as well as outside; it prefers Badila to any other. I find fresh, sweet cane quite as good for baits as sour cane; molasses darkens the bait and makes it difficult to see the captured beetles. I am quite sure that the borer will not be very plentiful, unless the cane is broken. The eggs laid in cane last April are now coming out in beetle form (last week of July). From June to last of July, I estimate that I have caught about 12,000 beetles and grubs, my outlay, not counting my own and boy's labor, being some £14."

During the time which I spent in the fields, a small quantity of the adults were collected and sent alive to the laboratory at Nelson (Cairns), N. Q., where they were kept temporarily under a wire cage containing pieces of cane. They fed upon the ends of these pieces, inserting their rostra into the soft pith. They were kept successfully in this cage until August 12, 1912, when they were taken out and counted; there were sixty-three males, fifty-four females—all collected at random in the Innisfail district from cane plants. From the ends of the pieces of cane upon which they

had been feeding for several weeks and which were now fermenting and dying, were recovered six eggs which died when exposed to the atmosphere.

Thirty-three random beetles were taken and confined singly in long glass vials plugged with cotton (vial 4 inches long by $\frac{3}{4}$-inch diameter); they were not fed, and spent most of their energy in trying to escape; they died as follows: After one day, three males; two days, 6 males, 5 females; after three days, 8 males, 5 females; on the fourth day, 4 males, 2 females. They thus seemed to require a constant supply of food.

Ten random pairs were placed on a cane plant (leafless) under a high Tower breeding cage; all were dead after three weeks, as was also the cane plant.

On October 1, 1912, a single young larva was placed within a wound made in the top side of a strip of cane which had rooted in a box of earth; this larva hatched from eggs deposited between September 19–30, 1912. It developed; on November 27, or after nearly two months, the cane was cut off just below the spot where the young larva had entered, exposing a cylindrical channel which was five inches long, traversing four nodes. The grub was found at the end of this channel, nearly full grown. On December 20 the plant was examined again; the grub had gone four inches farther down and then returned, constructing a cocoon at about the place where it had been found in November. The cocoon contained a pupa which was accidentally injured. The plant was dead. The period of development in this case was about three months, probably longer than natural because of the unhealthy plant in which the grub developed. When placed into the plant, the young grub was about a week old or less.

Eleven glass jars were taken on August 12 and partly filled with about an inch of moist, sifted soil upon which was placed a node of matured cane; into each of these was introduced a male and female beetle of about equal size. The jars were then covered with cheese cloth. Four similar jars received single females taken at random and a fifth jar, five females. From time to time, the pieces of cane were removed from these jars, examined and a fresh piece added. The removal became necessary in most cases because of moulds developing on the cane. The beetles fed from the pith

at each end and eggs were laid into the ends quite frequently. The following short tables summarize:

TABLE I.—SUMMARY OF ELEVEN PAIRS KEPT IN CONFINEMENT FROM AUGUST 12, 1912.

No.	Dates of Finding	No. Eggs	No. Larvæ	Total Progeny	Death		Length of life —Days	
					Male	Female	Male	Fem'le
1	Aug. 19, 24; Sep. 19; Oct. 2, 10	11	4	15	.....	Oct. 20	...	69
2	Oct. 11; Nov. 15, 30; Dec. 7,16	1	18	19	Nov. 23	Dec. 10	103	120
3	Sep. 20; Oct. 2, 11; Nov. 13, 28; Dec. 7, 16.....	11	28	39	Oct. 10	Dec. 25	59	135
4	Oct. 1, 10; Nov. 11.....	4	4	8	Nov. 23	Nov. 23	103	103
5	Sep. 20; Oct. 2, 11; Nov. 12, 28; Dec. 7, 16.....	15	20	35	Dec. 3	Dec. 24	113	134
6	Sep. 20; Oct. 1, 12; Nov. 15, 30	8	15	23	Dec. 4	Nov. 25	114	105
7	Sep. 19; Oct. 1, 9; Nov. 11, 27; Dec. 6, 16.....	12	21	33	Dec. 3	Dec. 20	113	130
8	Aug. 19, 24; Oct. 1, 9; Nov. 28	6	7	13	Nov. 1	Nov. 20	81	100
9	Aug. 24; Sep. 19; Oct. 1, 10, 31; Nov. 27.....	8	9	17	Nov. 20	Nov. 15	100	95
10	Aug. 19; Sep. 20; Oct. 2; Nov. 13, 27.....	3	13	16	Nov. 21	Nov. 22	101	102
11	Aug. 19, 24; Oct. 3, 12; Nov. 15, 30.....	3	17	20	Nov. 5	Nov. 25	85	105

TABLE II.—SUMMARY OF FEMALES KEPT IN CONFINEMENT FROM AUGUST 12, 1912.

Lot	Dates of Finding	No.of Eggs	No. Larvæ	Total Progeny	Death	Length life —Days
1	Sep. 18; Oct. 1, 9, 31; Nov. 27; Dec. 16....	20	21	41	Dec. 30	140
2	Aug. 24; Sep. 20; Oct. 3, 12.....	5	8	13	Oct. 20	69
3	Sep. 19; Oct. 1.....	0	2	2	Oct. 1	50
4	Sep. 20; Oct. 3, 12.....	12	3	15	Oct. 22	71
5*	Aug. 19, 24; Oct. 2, 10, 30; Nov. 27; Dec. 6, 16.....	27	13	40	Nov. 23†	103

*Five females. †Average time: one died after 51 days, one after 107 days, two after 110 days and one at the end of 136 days.

The total progeny of a female for several months is not very large from these data, but I am quite sure that all of the eggs were not found; the food was changed about every ten days. At any rate, it is quite evident that both sexes are able to live some weeks and that the rate of egg-laying is slow. Also that the young larvæ are quite unable to live in dried-up cane and that the beetles require a constant supply of food. The egg stage was not accurately obtained, but it was certainly not more than a week in duration. With better care, it is quite probable that the beetles would have lived considerably longer, still reproducing. Some of the females laid fertile eggs, when isolated from males, for about four months after. The rate of oviposition was not regular, sometimes several weeks elapsing between ovipositions.

From the practical standpoint, it may be that an important fact has been learned, namely, that the adults readily feed upon and lay eggs into fresh pieces of cane cut from the plant and it would seem desirable to try this method in place of the traps or else in conjunction with them. Not only would the beetles be thus caught, but also their progeny. These pieces could be strewn about and collected, say, every week and burned. It is quite possible, however, that the traps serve the whole purpose better because they offer a hiding place and to catch and kill the beetles is to put an end to all their progeny. Van Dine, in fact, states that this is what actually occurs in the case of the trapping, What I have seen of the latter would make me believe it to be an effective and practicable remedial operation and when used in conjunction with the operations already recommended by entomologists, there should be little or no difficulty in combatting this insect.

DOCTORS BARNES AND McDUNNOUGH ON FLORIDA LEPIDOPTERA.

BY HARRISON G. DYAR, WASHINGTON, D.C.

The article by Drs. Barnes and McDunnough on pages 27–31 of the January Canadian Entomologist has been noted. The article makes the appearance of a vindication, but is so vague that it can scarcely be answered. The gentlemen plead guilty. The plea may perhaps be considered to procure an ameliorization of sentence; at least, I shall be very glad to see any of their names rescued from the sorry pile of synonymy that they have created. Of positive statements in the gentlemen's paper there are but two:

1. *Acidaliodes coides* B. & McD. is not a *Pseudocraspedia*, but a good species. I must, of course, accept their statement of fact, which I am very glad to do.

2. *Manatha nigrita* and *Prochalia pygmæa* are separable from *Platæceticus gloveri* by the presence of vein 6 in the hind wing in the former and the absence of a branch to vein 1b of fore wing in the second. These characters are of value, I believe, and are not valueless like the condition of the radial nervules, which I had in mind in speaking of *carbonaria*. It gives me pleasure, therefore, to retract the synonymy of these species and to recognize *Manatha nigrita* as

distinct from *gloveri* by venation and larval case. I regret that I overlooked the venation in making the examination for Mr. F. M. Jones, or he might have described this also with his new species *tracyi*. *Prochalia pygmæa* is evidently more nearly related to *Chalia rileyi* Heyl. than to *gloveri*, where I placed it, hastily as it now appears. Perhaps it is the same. Heylærts describes *rileyi* with 10 veins in fore wing, 7 in hind wing. My specimens have 11 veins in fore wing, 8 in hind wing; *Prochalia pygmæa* is said to have 12 veins in fore wing, 8 in hind wing. So few specimens of these forms are known in collections that the extent of variation cannot be stated, and I will, therefore, not make a positive reference of *pygmæa* now, though I think it probable that we have but one variable species in *C. rileyi*.

THE GALL PRODUCED BY *CYSTIPHORA CANADENSIS* FELT.

BY A. COSENS, TORONTO.

In Vol. XLV, No. 12, of this publication, Dr. E. P. Felt has described a new species of gall midge, *Cystiphora canadensis* Felt, reared by the writer from galls collected in this locality. The obtaining of a large number of specimens has made possible a fuller description of the gall.

It is produced on the radical leaves of *Prenanthes alba* L. or *altissima* L. As both these species grow in this locality, and only the radical leaves are infected by the midge, it is difficult to decide which species is serving as the host.

The gall is of the typical ocellate form, with a light yellow centre from 1—2 mm. in diameter, surrounded by a deep purple ring, averaging 2 mm. in width, which is bounded on the outside by a much narrower ring of the same shade as the centre of the gall. In immature galls the circle at the centre is green and in some exceptional cases entirely absent. When the galls are formed close together on the leaves, they are often connected by the widening of their outside yellow rings. The concentric rings of colour are much more apparent on the upper than the lower surface of the leaf.

The galls are frequently so numerous on the leaves as to almost cover them. In one instance forty specimens were found on a single leaf.

AN EGG-PARASITE OF THE TARNISHED PLANT BUG, *LYGUS PRATENSIS* L.

BY C. R. CROSBY AND M. D. LEONARD, ITHACA, N. Y.

On October 3, 1913, while examining flower-heads of the daisy fleabane, *Erigeron ramosus*, we found one egg and two egg-shells of the tarnished plant bug, *Lygus pratensis*, with the tip slightly inserted in the receptacle. The flower-head was placed in a vial, and in a few days the egg took on an abnormal blackish colour. On October 7 a hymenopterous parasite emerged. From other flower-heads placed in a breeding-cage two other parasites of the same species were obtained on Oct. 21 and 27. This parasite is apparently undescribed.

Anagrus ovijentatus, n. sp.

Female.—Length .64 mm., abdomen .36 mm. General colour black; eyes dark red; antennæ blackish, except pedicle below and scape at tip, which are dull yellowish. The legs dull yellowish; coxæ dusky; femora broadly banded with dusky; middle and hind tibiæ dusky except tip and base; last tarsal segments dusky. Abdomen black, very slightly tinged with yellowish at the tip.

Fig. 19.—*Anagrus ovijentatus.*

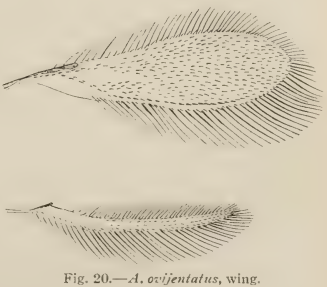


Fig. 20.—*A. ovijentatus*, wing.

The relative length of the antennal segments is indicated by the following ratio: scape 4, pedicle 3, first funicle 1, second 2, third, fourth, fifth and sixth 3, club 5.

The ciliation of the wing is shown in figure 20.

Described from three females, Ithaca, N.Y., Oct. 7, 21, 27, 1913.

Type deposited in the Cornell University collection.

According to Girault's table of the North American species of *Anagrus* (Trans. Am. Ent. Soc., XXXVII, pp. 297-298, 1911), this species runs to *A. saga* Girault. The two species may be separated by the following characters:

1. Species entirely dusky black; funicle segments of the antennæ all shorter and much smaller than the pedicle; scape and pedicle subequal; tips of tibiæ pallid..... *saga* Girault.
2. Species black except for tip of abdomen, which is slightly tinged with yellowish; funicle segments of antennæ same size as scape, except first and second; scape and pedicle unequal; tips and base of tibiæ pallid..... *ovijentatus*, n. sp.

BOOK REVIEWS.

THE CHINCH BUG. By T. J. Headlee and J. W. McColloch, Agr. Expt. Sta., Manhattan, Kansas. Bul. 191, p. 287–353, 1913.

This bulletin sums up the results of several years' careful study of the Chinch Bug and the various means of control. The much-debated question of the value of the artificial distribution of the fungus diseases, especially *Sporotrichum globuliferum*, which attack the bugs, has been given much attention, and in order that the conclusions reached might be based on sound grounds, a study of the life-history of the fungus itself in its relation to temperature, moisture and various hosts was carried out. From their study of the life economy of the Chinch Bug and Chinch-Bug Fungus and from the results of various experiments conducted by themselves and other entomologists in various parts of the country, the authors conclude that the facts unite in showing that artificial distribution of the church-bug fungus, either on diseased bugs or by artificial cultures, is not worth the time and trouble it takes. They state, moreover, that the farmers of Kansas have lost millions by the advocacy of this method of control because it tended to encourage them to neglect known really efficient measures.

The study of why bunch grass makes practically the only safe winter quarters for the bugs gave interesting results and seems largely to explain why the proper burning of such hiding quarters in early winter has given so good results. The two great artificial

methods of control, namely, this burning of the bunch grass to destroy the hibernating insects and the dust barriers to prevent migration or to destroy the nymphs when migrating from wheat to corn, are very clearly explained and the grounds on which they are advocated are set forth in a convincing manner. So far as one can judge, the Bulletin should be very valuable to the farmers of Kansas and to any who have to study and combat this very destructive pest.

L. CAESAR.

THE HESSIAN FLY. By T. J. Headlee and J. B. Parker, Agr. Expt. Sta. Manhattan, Kansas, Bul. 188, pp. 83–138, 1913.

This is a technical bulletin giving a comprehensive account of the Hessian Fly in Kansas. The authors, however, have not limited themselves solely to Kansas conditions, but have made several very important references to the results obtained by other investigators in different parts of the United States, whenever by so doing they could make more clear the point at issue. The history, distribution, habits, life history, nature of injury, natural and artificial means of control have been discussed at considerable length. The most valuable parts of the bulletin deal with the effects of temperature and moisture on the insect; the part played by parasites; the uselessness or inadvisability of several advocated measures of control, and the effectiveness of other methods.

None of the measures advocated are new, but new data are given to prove more fully their value and considerable attention has been paid to answering the objections that have been made to them. The control measures advocated are (a) destruction of the insects on infested stubble preferably by ploughing under, (b) destruction of volunteer wheat, and (c) late sowing. In addition to these, the importance of a fertile, well-prepared seed-bed and good seed are emphasized. It is shown that climatic conditions and parasites play a very important part in control, but that they can never be relied upon to take the place of the measures just mentioned. Though the bulletin describes Kansas conditions, almost everything that it contains has a direct bearing upon this pest in Canada or elsewhere and is also very valuable by way of comparison with our local conditions.

L. CAESAR.

BOMBYCIA IMPROVISA AND *TEARLII* HY. EDWARDS.

I have in my collection one specimen of *Bombycia improvisa*, taken at Ladysmith, Vancouver Island, Oct. 10, 1907, which I compared with specimens so labelled in the cabinets of the late G. W. Taylor, of Wellington, B. C., but on further examination I found that the specimens did not agree with the figure of *improvisa* in Holland's Motto Book.

The specimen was submitted to the late Dr. J. B. Smith, who wrote me under date of April, 1908: "The determination is correct. I never noticed before that Holland makes *tearlii* a synonym of *improvisa*. *It is not.* He figures *tearlii*, and not *improvisa*."

In Dyar's Catalogue *tearlii* is noted as a synonym of *improvisa*.

This season I have been fortunate in securing two specimens of *tearlii*, identical with that figured by Holland and entirely distinct from the specimens of *improvisa* of Vancouver Island.

The correction must therefore be made in Holland's work, and the name *tearlii* be restored to its place in our nomenclature.

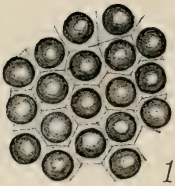
J. W. Cockle, Kaslo, B. C.

THE LONDON BIOLOGICAL CLUB.

A society with the above title has recently been formed in London, Ontario, the organization consisting of a general club for conducting the business of the whole and of a number of sections devoted to special departments of biology. The objects of the club are stated to be: "(a) the development and advancement of the study of biology in general and of the subjects represented by the sections in particular; (b) the conservation of living things, including man and all useful to him; (c) the economic and scientific destruction of such living things as can be shown inimical to man."

The wide scope of the club is set forth in the bylaw relating to sections which, it states, may be organized to deal with the following subjects: Archæology, Bacteriology, Botany, Entomology, Ethnology, Ichthyology, Paleonthology, Psychology, Ornithology, Sociology, Zoology, Bees, Poultry, Horses, Dogs, Cats, etc. It is provided further that any members, not less than three in number, may apply for the creation of a new section on any other subject relating to Biology. The club has begun with a fairly large membership, and with such an extensive field of operations should attract a great number of persons who take an intelligent interest in matters outside of their daily routine of work.

Mailed May 7th, 1914.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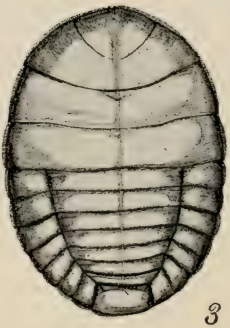
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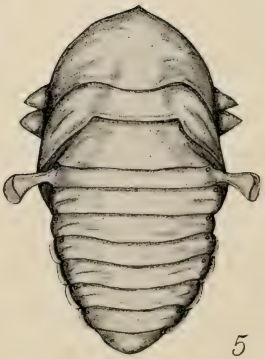
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PSEPHENUS LECONTEI AND STENELMIS BICARINATUS.

The Canadian Entomologist.

Vol. XLVI. LONDON, JUNE, 1914 No. 6

LIFE-HISTORY NOTES ON TWO COLEOPTERA (PARNIDÆ).

BY ROBERT MATHESON, ITHACA, N. Y.*

Psephenus lecontei Lec.

Although many notes, brief references, and figures of the larva (fig. 3), water penny, of this beetle have appeared from time to time in American literature, no consecutive account of its life-history has as yet been published. As this extremely interesting species is found very widely distributed in America and is of considerable interest on account of its peculiar larval form it seems to me that a short account, though gathered from desultory observations extending over the past two years, would not be out of place at this time.

Ordinarily the beetles are not usually observed by the collector though practically everyone who has any interest in entomology has seen the peculiar larvæ on the under side of stones, etc., in any of our rapid streams. In some streams they are very abundant and usually so in the swifter-flowing portions, particularly where the stones break the surface of the water into ripples. Here also the beetles are found, often in considerable numbers, but not in the water. H. G. Hubbard, in the American Entomologist for 1880 (p. 73), well described the habits of the adults. Both males and females may usually be found, particularly during the heat of the day, gathered upon stones in mid-stream which just break the surface of the water. They are very active, flying about, and chasing one another over the stones. I have never seen them plunge into the water nor suffer themselves to get wet. They are usually very easily frightened and one has to approach cautiously with a net in order to catch them; for they take sudden flight and one can scarcely follow their movements. However, if one will look around carefully they will usually be found only a few feet away actively playing on another stone.

*Contribution from the Entomological Laboratory of Cornell University.

I have observed the adults performing in this manner in Fall Creek and Coy Glen here at Ithaca and in the Salmon River at Truro, N. S. Guided by the activities of the adults I was not long in finding the eggs. They are laid in masses on the under side of stones, usually in the swiftest water. I have found these egg masses in shallow streams and also in rivers where the water was several feet deep, the current often so swift as to render footing difficult. The females when engaged in egg laying are very sluggish and never attempt to escape. One may easily observe the egg-laying process if he is careful to remove the stone on which the eggs are being deposited. Egg laying was common at Ithaca on June 25, 1911, at Truro, N. S. on July 14, 1913.

The eggs are deposited in a single, irregular layer. They are placed closely beside one another, often forming a layer of considerable extent (Fig. 2). At first the eggs are bright orange in colour, soon turning lemon yellow. They are firmly held together and to the stone by a tough, hyaline substance. In examining an egg mass removed from a stone, each egg is seen to be placed in the centre of a gelatinous envelope, hexagonal in outline. A layer of lemon-yellow eggs, each egg placed in the centre of its gelatinous envelope, presents a rather beautiful appearance, (fig. 1). The eggs are practically spherical in shape, measuring .18 mm. to .2 mm. in diameter. Some eggs may be a little larger, others smaller, but the above measurements represent the average size. The eggs are perfectly smooth without markings of any kind.

I was not able to rear the larvæ from the eggs nor study in detail their natural history. It would undoubtably be of considerable interest for any one to study the form of the larva at hatching and what changes it undergoes during its larval existance. No one I believe has examined the stomach contents and nowhere have I found mention of its feeding habits. I did not determine the time between egg laying and the hatching of the larva. Judging from observations, the life-cycle lasts slightly less than a year,—egg-laying taking place during the latter part of June and July, the larvae reaching maturity the following season.

In the references to this species in literature I have found but one note on the pupa. Hubbard in the American Entomologist for 1880, p. 73, speaks of the larva leaving the water and

pupating under the larval skin beneath stones, boards, etc., in damp situations. He did not mention when they could be found. Last summer (Aug. 6, 1913) while collecting along the bank of Salmon River I was attracted by the large number of empty larval skins of this species. Though I had noticed such skins previously I had always discovered them empty. In searching over a large number I was fortunate to find two pupæ not yet transformed. Nearly a month previously the adults had been observed egg-laying, so evidently the time of pupation extends over a considerable period. How long the pupal period lasts I did not determine.

The pupæ are found on the under side of stones, boards, etc., in damp situations. I found the larval skins very abundant under loose rocks overhanging the Salmon River. These sedimentary rocks are soft and many cracks extend in all directions, retaining a considerable amount of moisture. The last larval skin is firmly attached to the rock. Under this skin the pupa is formed. The larval skin on the ventral side splits transversely just in front of the mouth parts and is forced back to the tip of the abdomen where it remains (fig 4). The pupa is pure white in colour and very tender. It is held in place under the larval skin by the unshed anterior ventral portion and the shed skin at the caudal end. In this way the pupa is prevented from coming directly in contact with the hard underlying rock, etc.

Although there are several extended descriptions of the larva and larval structures I have found scarcely a word regarding the pupa. The pupa is pure white in colour, measuring 4.5-5mm. long. The anterior end is firmly held in place by the remaining portion of the larval skin, while the end of the abdomen remains beneath the cast larval skin. However, if one carefully lifts the pupal head, then loosens the abdomen he will be surprised to find the pupa still firmly held in place. Carefully pushing the pupa it soon breaks away and discloses a process on each side extending from the latero-dorsal angles of the first abdominal segment. These processes are firmly attached to the lateral walls of the enveloping larval skin. A dorsal view of the pupa showing these peculiar processes is shown in fig 5. The pupa is perfectly smooth without any spines or setæ. There are eight abdominal segments on the

dorsal side. The seven pairs of spiracles are prominent, all except the third pair being black at the tip. The eyes are prominent and somewhat blackish. The legs and wing-pads are held in position as shown in fig 4 (ventral view of the pupa in position in the larval skin).

Stenelmis bicarinatus Lec.

This species is quite common in Salmon River and I was not surprised to find the larvæ and pupæ under stones along the banks. Unfortunately, however, it was rather difficult to determine the larva or pupa of this species as quite a number of other species of Coleoptera were not uncommon in similar situations. However, I found a considerable number of larvæ transforming and many pupæ, one of which I reared so that I was able to definitely connect all the different stages. The larvæ leave the water about the last of July or the first of August and construct small, smooth, pupal chambers in damp situations under stones. I found many pupæ and a number of larvæ in such situations about August 7, 1913. The beetle reared from one of these pupæ emerged on Aug. 10th. Further than this I know nothing of the life-cycle of this species, but this note may throw a little light on this small family of interesting forms.

The larva (fig. 6). The mature larva, ready to pupate, measures 6.25 mm. long, and 1 mm. wide at its broadest part. It is heavily chitinized, reddish brown in colour, the head and terminal segment of the abdomen being almost black.

The head is small and the mouth parts very inconspicuous. The antennæ are three-jointed, yellowish brown in colour, 1st segment measures .05mm., 2nd .09 mm.; the third, consisting of two very small segments lying side by side, .027 mm.

The larva consists of 12 segments exclusive of the head. The last abdominal segment is longer than the two preceding segments and ends in two sharp, short spines with two rounded lobes between (fig. 6). The entire cuticle is densely covered with small, dark elevations, each bearing a very minute spine. Otherwise, there are no distinctive markings. The legs are short, well developed and suited for clinging closely to stones or other objects in swiftly flowing streams.

The pupa (fig. 7). The pupa is soft, white in colour, the

thoracic segments, wing-pads and legs being slightly dark in colour. This darkness deepens with the age of the pupa. Length 3.4mm.; width at base of wing pads, 1.2 mm.

The head lies incurved under the prothorax, the developing mouth-parts showing very distinctly. The eyes are small and almost black. The antennæ lie in front of the eyes and extend under the pronotum, thus being concealed from the dorsal view. The wing-pads are prominent.

The pronotum is large and rather densely covered with fine colourless setæ. The outer angles of the anterior margin each bear a long, curving spine, measuring .32 mm. The posterior outer angles also, each bear a spine measuring .28 mm. These spines are yellowish brown in colour. They support the pupa in its chamber, preventing it from coming in contact with the coarse grains of sand.

The abdomen is composed of nine segments, the posterior margins on the dorsal side being strongly elevated into narrow ridges. These ridges are clothed with numerous short setæ. The ninth segment bears on its dorsal side two curving stout cerci, measuring .4 mm. in length. These cerci almost completely conceal the segment from which they arise. The pupa rests on its back in the pupal chamber. By the aid of the prothoracic spines and cerci together with the numerous short setæ arising from the raised ridges of the abdomen, injury from the roughened walls of the pupal chamber is avoided. The posterior margins of the wing pads and the legs are also provided with many short setæ.

THE KNOWN NYMPHS OF THE CANADIAN SPECIES OF *LESTES* (ODONATA).

BY E. M. WALKER, TORONTO.

The only attempt that has yet been made to separate the nymphs of the North American species of *Lestes* is that of Professor J. G. Needham in his report on "Aquatic Insects in New York State."* Professor Needham gives an excellent generic description of the nymph and a table for the partial separation of the five species that he reared, viz., *L. uncatus*, *unguiculatus*, *rectangularis*, *forcipatus*, and *eurinus*. Good figures are given of *L. rectangularis*.

*Bull. 68, N.Y. State Museum, 1903, pp. 228-236.

In 1908† the same author described the nymph of another species, *L. vigilax*.

To these six species I can add two others, *L. congener* and *L. disjunctus*, both of which I obtained on Vancouver Island during the summer of 1913.

These are all the species of *Lestes* known from Canada and the Northern United States, except *L. inæqualis*, although *L. eurinus* has not been certainly reported from the Dominion.

Of the nymphs of this genus reared by him, Professor Needham says: "I find them well-nigh indistinguishable specifically. Aside from slight and inconstant differences in size and a few very minor structural characters, they are all alike." Certainly they are a difficult group and can only be studied satisfactorily with an abundance of material. Nevertheless, I believe that most, if not all, of the species can be distinguished, provided both sexes are present, though I must admit that it is very doubtful whether single individuals, especially males, can be recognized with certainty in all cases.

In regard to *L. forcipatus* and *L. unguiculatus*, I can say very little, as I have seen no good specimens of either. These species have therefore been omitted from the key that I give below, though I have discussed them as far as the material before me permits in the notes that follow.

The key is based upon an examination of specimens kindly lent me by Professor Needham, as well as material collected by Mr. R. P. Wodehouse, of Toronto, and myself.

Key to the Known Nymphs of Canadian Species of Lestes.

A. Lateral spines present on abdominal segments 4- or 5-9; labium, when closely applied to the ventral surface, reaching to or beyond bases of hind coxæ.

B. Mentum of labium relatively stout in its proximal half, its narrowest part being about one-third of the apical breadth; lateral setæ 4 or 5 ..... *congener*.

BB. Mentum of labium very slender in its proximal half, its narrowest part being not more than one-fifth of the apical breadth; lateral setæ normally 3.

†Bull. 124, N.Y. State Museum, 1908, p. 197.

C. Lateral spines on segments 4-9; mentum of labium 5.5-5.75 mm. long, barely reaching base of hind coxæ*; mental setæ 7 or 8, hind femora 6 mm.; outer wing-pad 6.5 mm. . . . . *eurinus.*

CC. Lateral spines on segments 5-9 (4-9 in one specimen of *disjunctus*), mental setæ usually 5-6, but often 7; hind femora less than 6 mm. long; outer wing-pad 5.5 mm. long or less.

D. Mentum of labium more than 4 mm. long, reaching generally to apex of hind coxæ or beyond; ovipositor extending beyond apical margin of segment 10.

E. Mentum of labium 4.3-5.1 mm. long, reaching apex of hind coxæ or slightly beyond; ovipositor 3-3.5 mm., extending beyond basal joint gills . . . . . *uncatus.*

EE. Mentum of labium 4.75-5.5 mm., reaching beyond apex of hind coxæ, often to apex of trochanters, ovipositor 2 mm. long, extending very little beyond apical margin of segment 10. . . . . *disjunctus.*

DD. Mentum of labium 3.7-4 mm. long, reaching generally to about the middle of the hind coxæ; ovipositor just reaching apical margin of segment 10. . . *rectangularis.*

AA. Lateral spines present on abdominal segments 2- or 3-9; labium reaching barely to bases of hind coxæ or not so far. . . . . *vigilax.*

Lestes congener Hagen.

Both sexes of this species were reared at the Dominion Biological Station at Departure Bay, near Nanaimo, Vancouver Island. The nymphs were obtained from Lonely Lake, a large pond a few miles from the Station in the depths of a rocky, coniferous forest. Two species of *Lestes* occurred near here, *L. disjunctus* and *L. con-*

*This character is doubtless somewhat variable as in other species.

gener, but the latter commenced to transform when the period of emergence of the former was almost over.

The nymphs were taken on July 31, 1913, and emerged on August 7th, 8th and 13th.

Nymph.—Labium, when closely applied to ventral surface, extending caudad to a little beyond the base, or to the middle, of the hind coxæ; mentum narrowest about the middle, the breadth here being about one-third of the apical breadth, widening very slightly proximad; lateral lobe with inner margin crenulate, the teeth being much less developed than in other species of the genus; the row of teeth between the two hooks of the outer part also less developed than in the other species; 4 or 5 lateral setæ, there being 3 or 4 on the movable hook and one before its base.

Lateral spines present on segments 5-9, those on 5 minute but distinct; spinules on lateral carinæ of seg. 9 varying from 9 to 14. Ovipositor extending very slightly beyond the hind margin of seg. 10, the styli just reaching the margin. Gills but little tapering distally, being little or no narrower at the distal than at the proximal third, apices convexo-acute. The three dark bands are usually distinct but not sharply defined. The femora have an obscure preapical dark ring.

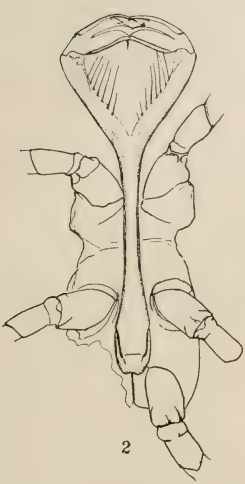
Length of body (without gills) 14.75 (contracted in alcohol) -20 mm.; labium(hinge to apex) 3.25-3.5 mm.; outer wing-pad 4.3-5 mm.; hind femur 4.7-5 mm.; gill 8.25-9.5 mm.

Described from four nymphs and three exuviæ.

Lestes eurinus Say.

Of this species I have only one male exuvia, with the imago and a mounted labium from another specimen, both received from Professor Needham.

The labium is not very long for the size of the insect as it extends back only to the base of the hind coxæ. Mentum very slender in the middle, being only about one-seventh of the greatest breadth; broadening towards the hinge to about twice this breadth. The mental setæ of the mounted specimen are 7 on each side, in the other they are 7 on one side and 8 on the other. There is nothing characteristic about the lateral lobes except that the outer part is rather broad and the teeth between the two hooks are more irregular than in most species.



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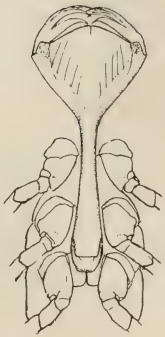

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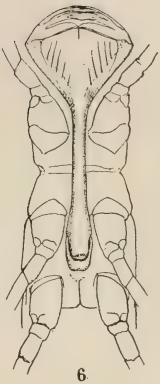

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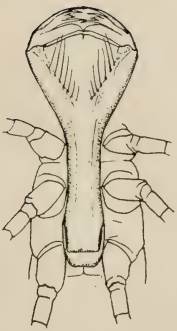

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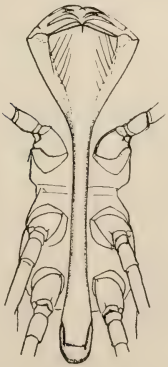

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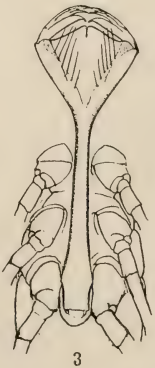

3

NYMPHS OF LESTES.

Lateral spines on abdominal segments 4-9, small but distinct on 4, increasing to 7, smaller again on 9. Gills tapering but little distally, the width at the distal third little less than at the proximal third, apices broadly convexo-acute.

Length of body (without gills) 25 mm.; labium 5.5 mm.; outer wing-pad 6.5 mm.; hind femur 6.0 mm.; gill 11 mm.

Lestes unguiculatus Hagen.

All that I have to represent the nymph of this species is the slide received from Professor Needham, on which the mouth-parts are mounted. The labium is of about the minimum size for *L. unc tus*, measuring barely over 4 mm. in length from hinge to apical margin of mentum. The mentum is of the same form and bears 7 mental setæ on the right side and 5 on the left, though there is a space on the left side that appears to have borne two others.

The lateral lobes have apparently no special characteristics but their exact form cannot be determined as they do not lie flatly on the slide.

Although nothing is known of the ovipositor of the nymph of this species, it is safe to infer that it is of about the same size as in *disjunctus* or *rectangularis*, as this relation obtains in the adults of these species.

Lestes uncatus Hagen.

On June 26, 1913, I found the adults of this species in enormous numbers about a prairie pond or "slough" at Prince Albert, Saskatchewan. The exuviæ were also numerous here and one nymph was taken when about to transform. I also have a considerable number of full-grown nymphs taken by Mr. R. P. Wodehouse from a pond on Fitzwilliam Island, Georgian Bay, Ont., June 29th, 1912, where they were taken in company with nymphs of *L. rectangularis*. In addition to these I have a slide from Professor Needham, on which the mouth-parts are mounted.

It is a somewhat larger and slightly stouter nymph than that of *L. rectangularis* and the labium is noticeably larger. The females are easily recognized by the very large ovipositor, a character that is also present in the adults. This feature is probably shared by *L. forcipatus* (q.v.).

Nymph.—Labium long and slender, extending usually slightly beyond the apices of the hind coxæ but sometimes not quite reaching the apices, in other cases extending as far back as the middle of the hind trochanters. Slender proximal part of mentum about two-thirds of its entire length, the middle breadth being about one-seventh of the breadth at base of lateral lobes, widening proximad to more than twice this breadth at the hinge; mental setæ usually 6 or 7, rarely 5 or 8 on one side; inner part of lateral lobes with the marginal teeth prominent, the outer part broad with the row of teeth straight and more regular than usual; lateral setæ normally 3, rarely a fourth on the movable hook.

Lateral spines present on abdominal segments 5- or 6-9, those on 5, when present, very minute. Spinules on lateral carinæ of 9 varying from 10 to 14. Ovipositor much larger than in any other species examined, the tips of the styli reaching the level of the basal joint of the gills, the apices of the ovipositor slightly beyond the joint. The sides of the valves are perpendicular, and their ventral surfaces narrow; the longitudinal series of minute hairs along the ventro-lateral margins is very inconspicuous. Gills widest about the proximal third, tapering considerably in the distal half, the width at distal third about two-thirds that at the proximal third, apices acute.

In distinctly marked specimens (in alcohol), the dorsum of the abdomen is largely brown, the femora have a brown preapical annulus and the tibiæ and tarsi are apically infuscated. The dark bands of the gills are often sharply defined.

Length of body (without gills) 22-24 mm.; labium 4.3-5.1 mm. (av. 4.7); wing 4.9-5 mm.; hind femur 5-5.1 mm.; gill 8.9-10 mm.

Lestes disjunctus Selys.

I found the adults of this species in great abundance in two marshy coves on the edge of Lonely Lake, Vancouver Island (see under *L. congener*). There were also great numbers of exuviæ which I felt safe in referring to this species as it was the only one present. I dredged up a number of nymphs which I also assumed to be *disjunctus*, but the few that were reared all proved to be *congener*. Only one specimen, not reared, was *disjunctus*. The

time for emergence of this species was practically over at the time the nymphs were collected (July 31, 1913).

Nymph.—Labium exceedingly long and slender, reaching back beyond the apex of the hind coxæ or even beyond the trochanters. The slender proximal part of the mentum includes about two-thirds of its length and its breadth, at the middle, is about one-seventh of the breadth at the base of lateral lobes. It expands proximad to more than twice its middle breadth. Mental setæ 6 or 7; lateral lobes similar to those of *uncatus*, the row of teeth on the outer part somewhat less regular; lateral setæ 3.

Lateral spines on segments 5-9 (4-9 on one specimen); 11-14 spinules on lateral carinæ of segment 9. Ovipositor extending slightly beyond the hind margin of segment 10, the styli reaching fully as far back as the apex. The longitudinal series of minute hairs on the ventral surface of the valves is slightly mediad of the lateral margin of the valves. Gills broadest at the proximal third, thence tapering gradually to the slender pointed apices, the breadth at the distal third being less than two-thirds of the breadth at the proximal third. The dark bands of the gills are somewhat diffuse in all the specimens, and in some very feebly indicated. The only other indications of a colour-pattern are the very feeble preapical femoral annuli and the darkened apices of the tibiæ and tarsi in some individuals.

Length of body (without gills) 18-19 mm.; labium 4.75-5.5; outer wing-pad 4.5-5mm.; hind femur 5.1 mm.; gill 8.8-10 mm.; ovipositor 2-2.3 mm.

Described from two nymphs and four exuviæ.

Lestes forcipatus Rambur.

I have only a fragmentary male exuvia with the imago and four mounted labia, of this species, received from Professor Needham. The exuvia lacks both head and gills so that it is impossible to form a proper idea of the characters of the nymph. Moreover, one of the mounted labia is considerably larger than the others and appears to me to belong to a different species. Professor Calvert, however, has kindly furnished me with the following data taken from a male, reared by himself. The nymph was collected in Delaware Co., Pa., July 16, 1891, and transformed on July 22.

Mental setæ 6 on each side; lateral setæ 3+1 small one on the lateral edge of each lateral lobe, just proximal to the articulation of the movable hook. Lateral spines on abdominal segments 5-9, smallest on 5. Spinules on lateral carina of segment 9, 14 on right side, 12 on left. Length of body, without gills, 17 mm.; mentum of labium 3.8 mm.; outer wing-pads 5.5 mm.; hind femur 5 mm.; gills 9 mm.

In Professor Needham's material these characters are quite similar to the above, in so far as they are represented, except that one of the labia is larger than the others, measuring 5 mm. in length, whereas the others measure barely 4 mm. or a little less. One of the latter is labelled "bred." In all the specimens there are 3 lateral setæ and 5-6 mental setæ on each side. The rudimentary seta mentioned by Professor Calvert is present in all the specimens and in fact is rarely absent in any of the species of Lestes I have examined. In the exuvia from Professor Needham, there are lateral spines on abdominal segments 5-9, and the lateral carinæ of segment 9 bear 13-14 spinules.

In all these characters and also in the form of the labium and its lateral lobes, there is nothing to distinguish the nymph of this species from that of *L. rectangularis*, but the ovipositor will probably prove to be much larger, resembling that of *L. uncatus*, since these relations obtain in the adult.

Lestes rectangularis Say.

I have bred this species at Toronto and have a large number of full-grown nymphs taken by Mr. Wodehouse from a pond on Fitzwilliam Island, Georgian Bay, in company with *L. uncatus*. I also have exuviæ and adults reared by Professor Needham and a number of nymphs taken by him at Old Forge, N.Y.

Nymph.—Somewhat smaller than that of *L. uncatus*, and of somewhat slenderer build. Labium of moderate length, generally reaching back to about the middle of the hind coxæ, but sometimes not quite reaching their bases while in two specimens, otherwise like this species, it extends a little beyond the apices of the coxæ. In none of the four exuviæ of bred specimens that I have does it extend beyond the base of the coxæ. The slender proximal part of the mentum is about 1.25 to 1.5 times as long as

the expanded distal part, and just before the latter, it is narrowed to about one one-sixth of the width at the base of the lateral lobes, widening towards the hinge to about twice this breadth. Mental setæ normally 5, occasionally 6 on one side. Lateral lobes similar to those of *disjunctus*, lateral setæ 3.

Lateral spines on segments 5-9, of small size, those on 5 usually a little longer than in *uncatus*. Spinules on lateral carinæ of 9, 10-14, usually 11-13. Ovipositor of moderate size, the apex and styli reaching the hind margin of segment 10. The longitudinal series of minute hairs is present on the ventro-lateral edges of the valves. Gills slender, gradually tapering from the proximal third, the breadth at the distal third being about three-fourths or three-fifths that at the proximal third, apices bluntly convexo-acute.

The coloration is quite similar to that of *uncatus*. Some specimens are very distinctly marked, the bands on the gills being very conspicuous and sharply defined.

Length of body 19-21 mm.; labium 3.6-4.0 mm.; outer wing-pad 4.5-5.5 mm.; hind femur 4.5-5.13 mm.; gill 8.5-9.0 mm.; ovipositor 1.9-2.0 mm.

Lestes vigilax Hagen.

Although I have bred this species several times at Go Home Bay, where the nymphs are plentiful, I have at present only three exuviæ from reared specimens and one immature nymph from that locality and four exuviæ from Old Forge, N.Y., received from Professor Needham.

They are readily distinguished from other species by the characters given in the key.

Nymph.—A slender nymph, similar in form to that of *rectangularis*.

Labium relatively short, not extending behind the bases of the hind coxæ and in one exuvia only to the middle coxæ; somewhat abruptly expanded in its distal part, which is about one-third to two-fifths of its entire length, narrowed at the middle to about one-seventh to one-fifth of the apical breadth, and widening towards the hinge to about twice the middle breadth. Mental setæ 5 (rarely a small sixth on one side). Inner part of lateral

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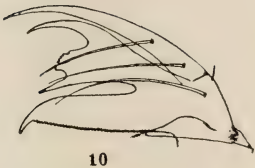

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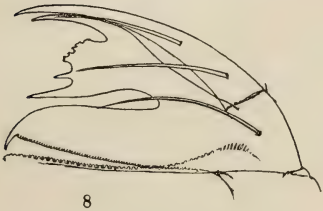

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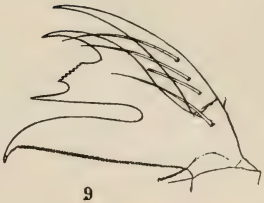

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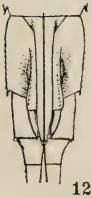

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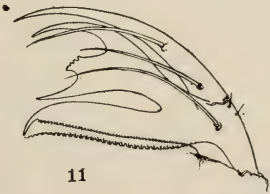

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NYMPHS OF LESTES.

lobes slenderer than in the other species, the marginal teeth prominent, the end-hook long and slender. Inner hook of outer part twice as long as the row of teeth, which is shorter than usual; lateral setæ 3.

Lateral spines on segments 2- or 3-9, larger than in the other species, those on segment 9, e.g., being about one-fourth the length of the lateral margin of segment 10. Spinules on lateral carinæ of segment 9 generally only 6-9, in extreme cases 5 or 11. Styli and apex of ovipositor not reaching the hind margin of segment 10, or the styli barely reaching the margin. The longitudinal series of minute hairs on the ventral margin of the valves is quite near the inner margin of the valves. Gills narrow, the margins being for the greater part of their length nearly straight and subparallel, apices rather broadly rounded, with or without slight indications of a point. Femora with a preapical annulus and the extreme apices dusky; a narrow subbasal tibial annulus is sometimes present.

Length of body (without gills) 21-23-5 mm.; labium 3.33-3.8; outer wing-pad 5.2-5.4 mm.; hind femur 5.0-5.5 mm.; gill 10.0-10-5 mm.; ovipositor 2 mm.

Explanation of Plates.

Plate XIII. Ventral views of labium and thorax, showing their relative positions when the former is closely applied to the ventral surface of the latter. The mental setæ are seen through the mentum, as they appear in the transparent exuviæ.

Fig. 1. *Lestes congener.*
Fig. 2. " *eurinus.*
Fig. 3. " *uncatus.*
Fig. 4. *Lestes disjunctus.*
Fig. 5. " *rectangularis.*
Fig. 6. " *vigilax.*

Plate XIV. Lateral lobe of labium (figs. 7–11) and ventral views of abdominal segment 10 of the female, showing ovipositor, etc. (figs. 12–16).

Fig. 7. *Lestes congener.*
Fig. 8. " *eurinus.*
Fig. 9. " *uncatus.*
Fig. 10. " *disjunctus.*
Fig. 11. " *vigilax.*
Fig. 12. *Lestes congener.*
Fig. 13. " *uncatus.*
Fig. 14. " *disjunctus.*
Fig. 15. " *rectangularis.*
Fig. 16. " *vigilax.*

AMERICAN TRICHOPTERA—NOTES AND DESCRIPTIONS.

BY NATHAN BANKS, EAST FALLS CHURCH, VA.

(Continued from p. 156.)

RYACOPHILIDÆ.

Rhyacophila bifila, n. sp. (Figs. 53, 56.)

Female: Related to *R. coloradensis*, the female appendages on the same plan, but both upper and lower pieces are more slender. Black, with black and gray or whitish hairs; palpi dark brown; antennæ brown, annulate with pale. Wings dark brown, densely irrorate with pale; the costal area mostly pale, stigma long and dark, outer margin with pale spots between the veins; in hind wings the stigma is also very long and dark; forks 1 and 2 equal in length, fork 3 reaching more than one-half way on fork 4.

Expanse 21 mm.

From Vernon, British Columbia, August (Bryant).

Rhyacophila acropedes, n. sp. (Fig. 39.)

Blackish, with black bristles and golden hair; palpi pale; posterior warts pale; antennæ yellowish brown; thorax with two strips of golden hair; legs pale, basal part of tibia I and II to middle spurs dark, basal parts of all tarsi dark; spurs blackish. Wings yellowish brown, darker near tip, mostly unmarked, but around apical margin are dark spots at ends of veins and pale spots between them; thyridial spot hyaline white; base of stigma dark; in hind wings, which are gray, the stigma is wholly dark. In fore wings fork 2 is a little longer than fork 1, fork 3 hardly one-half as long as fork 2, fork 4 with base nearly opposite fork 1; discal fork not before fork of median vein.

Expanse 20 mm.

From Deer Creek, Provo Canyon, Utah, 21 Aug. (Spalding).

Rhyacophila bipartita, n. sp. (Fig. 54.)

Palpi brown, paler on base; antennæ pale, annulate with brown; head and thorax with pale golden hair; legs pale, darker on tarsi. Wings pale brownish, with faint darker brown transverse marks, on stigma the marks are very distinct, also dark marks along cubitus, and at ends of veins; hind wings yellowish brown, the

stigma dark; fork 2 in fore wings plainly longer than fork 1; fork 3 about one-half way back on fork 4.

Expanse 20 mm.

From Banff, Canada, 30 Aug. (Sanson).

Glossosoma penitus, n. sp. (Figs. 16, 19.)

Black; basal part of antennæ pale; legs pale, spurs dark, vertex and thorax with yellowish gray hair; wings dark brown, with black hairs and dark brown fringe; a large corneous, black patch over basal anal area; hind wings with dense black costal fringe. In fore wings fork 3 reaches back as far as fork 2, not stalked, fork 4 about as long as its pedicel; in hind wings fork 3 is longer than its pedicel.

Expanse 12 mm.

From Peachland, British Columbia, 21 July (Wallis).

Agapetus malleatus, n. sp. (Fig. 57.)

Black; the tips of coxæ and bases of femora yellow, and basal part of tibia somewhat yellowish; head and thorax with yellowish hair; in fore wings fork 3 is very long, about twice as long as fork 4, fork 5 is long, widely divergent, reaching almost back to base of discal cell; in hind wings forks 2 and 3 are equal in size. Male has the lower appendage with broad tip, reaching beyond the upper piece, the latter very broad with acute process at lower tip; the process of sixth ventral segment short and blunt.

Expanse 11 mm.

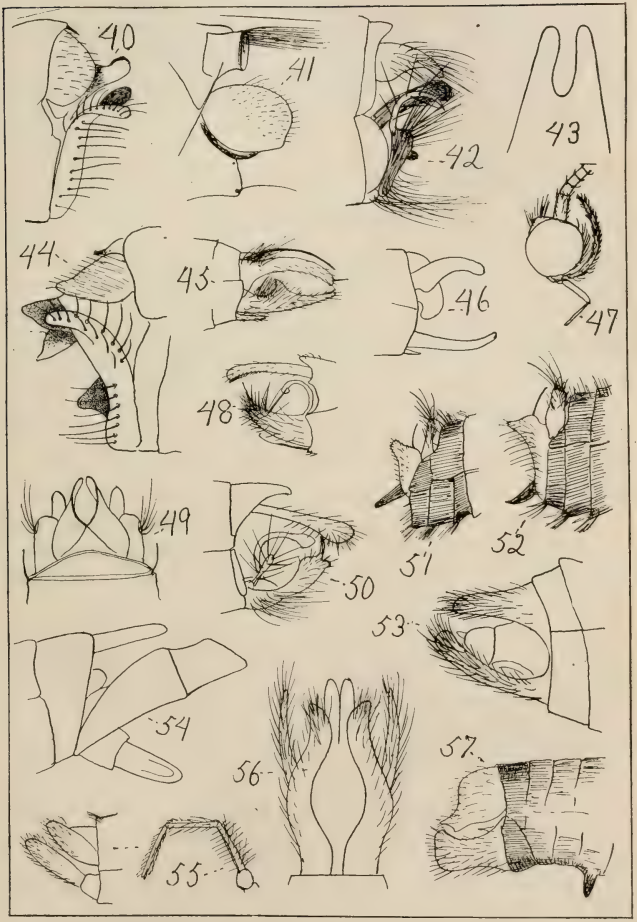
From Switzer's Camp, San Gabriel Mts., Calif., 3,000 ft., 17 June (Grinnell).

Paragapetus, new gen.

Similar to *Agapetus*; venation of front wings about the same, but fork 3 (in type species) is not longer than fork 4, and so does not reach as far forward. In hind wings the venation is similar to that of fore wings, but no fork 4; fork 1 is present and reaches back to discal cell; fork 2 also back to cell.

Paragapetus moestus, n. sp. (Figs. 18, 20, 23.)

Palpi black; antennæ dark, annulate with pale, head brown, white hair on the anterior part of vertex, brown hair on warts; abdomen dull black, genitalia yellowish, legs yellowish, tips of



NEW AMERICAN TRICHOPTERA.

tibiæ darker above and tarsi also darker. Wings black, with some scattered yellow hair, the principal marks being three costal spots of yellow, and three on hind margin, one at arculus, one beyond, and one before it; in disc various faint markings, transverse; anastomosis hyaline white, hyaline forked, mark on fork of median vein; hind wings gray, with gray fringe.

Expanse 8 mm.

From Black Mt., North Fork Swannanoa River, N. Car., May.

HYDROPSYCHIDÆ.

In the classification of this family great importance has been placed on the presence of ocelli, and of three spurs on the anterior tibia. Since both of these characters are common in the Rhyacophilidæ, the ancestors of the Hydropsychidæ, I think they are not of such great importance, and as ancestral characters are liable to break out in various places in the Hydropsychidæ. To use the two little appendages at the tip of the female abdomen would also produce false alliances. I have therefore below used a new character as of prime importance; one that is easy of application:

1. Fork 5 of fore wings subequal in length to fork 4; palpal joint 2 about as long as 3 or 4; inferior male appendages two-jointed, usually slender; penis often long and prominent.....2
   Fork 5 of fore wings much longer than fork 4 (or 4 absent); palpal joint 3 or 4 usually much longer than 2.....3
2. Hind wings broad, with a closed discal cell; fork 1 in fore wings; no warts in pits of mesonotum; tip of female abdomen not with two little appendages.....*Hydropsychini.*
   Hind wings narrow, no closed discal cell; fork 1 lacking in both wings; fifth palpal joint not nearly as long as others united; in female mid-tibiæ and tarsi dilated.....*Psychomyini.*
3. No warts in pits of mesonotum; ocelli present; spurs 2, 4, 4, mid-tibiæ and tarsi of female not dilated.....*Philopotamini.*
   A small wart in a pit each side on mesonotum; spurs 3, 4, 4; no ocelli; mid-tibiæ and tarsi of female dilated (at least a little.....*Polycentropini.*

The *Hydropsychini* will include *Hydropsyche, Hydropsychodes, Arctopsyche, Diplectrona, Rhyacophylax, Smicridea, Potamyia,*

Hydromanicus, Antarctopsyche, Symphitopsyche and *Stenopsyche.* This latter genus has been placed in the Philopotamidæ since it has ocelli, but is more allied to *Hydropsyche* by all other characters.

The *Psychomyini* will include, besides the usual genera, *Ecnomus*; it was also placed here by MacLachlan. *Tinodes* is removed to the next tribe.

The *Polycentropini*, besides the usual genera, includes *Tinodes;* this move is also warranted by the structure of the male genitalia.

The *Philopotamini* has the usual genera, as placed by Dr. Ulmer, but without *Stenopsyche.*

(To be continued.)

REPORT ON A COLLECTION OF JAPANESE CRANE-FLIES (*TIPULIDÆ, DIPTERA*).

BY CHARLES P. ALEXANDER, ITHACA, N. Y.

(Continued from p. 164.)

Genus: **Tipula** Linnæus.

Key to the Japanese Tipulæ.

1. Large species (over 30 mm. in length) 2
   Smaller species (less than 25 mm. in length) 4
2. Wings ochre-brown, the cross-veins darker, the stigma bright yellow [abdomen ochraceous-brown, the sternum paler] ..... *præpotens* Wied (1)
   Wings not ochre-brown with a yellow stigma 3
3. Abdominal tergites with the apices brown; hypopygium pale dull fulvous brown, thoracic dorsum blackish with two rusty lines ..... *mikado* Westw. (2)
   Abdomen with three dorsal longitudinal stripes, the median one indistinct on the basal segments ..... *coquilletti* End.
4. Wings hyaline or subhyaline, with the costal region darker .. 5
   Wings either subhyaline without a dark costal border, or else variegated hyaline, gray and brown 6
5. Thoracic notum yellowish; abdomen without a distinct stripe on either side ..... *yamata*, sp. n.

1 *Præpotens* Wiedemann; Aussereur. Zweifl. Ins., vol. 1, pp. 40, 41 (1828).
2 *Mikado* Westwood; Trans. Ent. Soc. Lond., for 1876, p. 504.

Thoracic præscutum and scutum dark; abdomen yellow, with a broad brown stripe on either side of the yellow median vitta ..... *aino*, sp. n.

6. Abdomen with the segments having a dark caudal margin ... 7
Abdomen lined with dark stripes 8

7. Caudal margin of the abdominal segments very narrow; wings light yellow without darker markings, except the prominent stigma ..... *insulicola*, sp. n.
Caudal margin of the abdominal segments broad, comprising at least two-thirds of the length of the sclerite; wings light gray with hyaline blotches ..... *nipponensis*, sp. n.

8. Head yellowish 9
Head black or dark brown 10

9. Abdomen with a median stripe; flagellum of antennæ black ..... *japonica* Loew(1)
Abdomen with three stripes, one median and two lateral: two basal flagellar segments yellow, remainder brown at base, yellow at tip ..... *serricauda*, sp. n.

10. Large species (length, ♂, 15 mm.; wing, 19 mm.) ..... *yusou*, sp. n.
Small species (length, ♂, 10 mm.; wing, 13-5 mm.) ..... *parva* Loew(2)

Tipula coquilletti Enderlein.

1898 *Tipula nubifera* Coquillett; Proc. U.S. Nat. Mus., vol. 21, p. 305.

1902 *Tipula nubifera* Kertess; Cat. Dipt., vol. 2, p. 299.

1912 *Tipula coquilletti* Enderlein; Zoöl. Jahrb., vol. 32, pl. 1, p. 7.

A male and female; the following addenda to Coquillett's description may be of value:

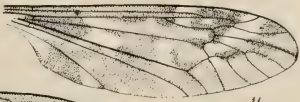
The legs in my specimens have the femora and tibiæ almost uniformly dark brown; abdomen very long for a *Tipula*. The wing is shown in plate 16, figure 7. Male hypopygium: 8th tergite rather broad, its caudal margin almost straight; 8th sternite (see plate (3) figure 17), much produced caudad into a scoop-like lobe which is very deeply notched medially, the tips of the lobes directed

1 *Japonica* Loew; Wiener Ent. Monatschr., Vol. 2, p. 101, 102 (1858).
2 *Parva* Loew; Wiener Ent. Monatschr., vol. 2, p. 102 (1858).
3 Plate 17 will appear in the next issue.

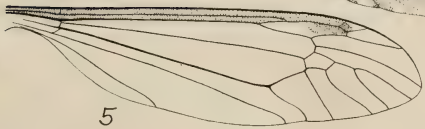
1.

2.

3.

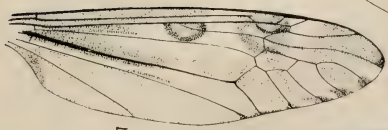


4.



5.

6.



7.

8.

JAPANESE CRANE-FLIES.

inward; 9th tergite rather small (see plate 17, figure 8), viewed from above, the caudal margin is narrowed and evenly concave, the whole caudal end being covered densely with small black spicules; suture between the sternum and tergum not clear; 9th sternite (plate 16, figure 7), broad, its caudal margin concave. Pleural appendage, a large flattened lobe (see plate 17, figure 10), on the inside (plate 17, figure 9), with the dorsal outer angle densely provided with short black spicules, with numerous other spicules down the inner face.

Female (allotypic): tergal valves of the ovipositor long and slender, heavily chitinized, not so deep as the high sternal valves.

Vial 13; Tokyo, Japan; April 25, 1912; 1♂, 1♀.

Tipula yamata, sp. n.

Head blackish; thoracic notum yellowish; anterior half of the pleura dark brown; abdomen without distinct longitudinal stripes; wings with a pale brown suffusion, the costal region a little darker.

Male, length 12 mm.; wing 16.6 mm.

Female, length 19.2 mm.; wing 16.8 mm.

Male.—Palpi dull yellow; frontal prolongation of the head rather short, dull yellow; antennæ light yellow, the flagellar segments passing into brown; front, vertex and occiput dark brown passing into yellow on the genæ.

Pronotum brown. Mesonotum light coloured, yellowish, with indistinct, narrow, darker stripes on the præscutum. Pleura, propleura and anterior half of the mesopleura and the metapleura, pale, whitish, Halteres long, slender, pale. Legs: fore and middle coxæ dark brown; trochanters and femora yellow, light brown at tip; tibiæ yellowish, brown darker at the tip; tarsi brown. Wings with a pale brown suffusion; costal border darker brown, this colour including cells C and Sc.; stigma greyish brown. Venation, see plate 16, figure 5.

Abdominal tergites 1-4 yellowish, 5-9 darkened, brownish; sternites 1-6 yellow, 7 yellow with a brown median line, 8 brown basally, yellow at the tip. Male hypopyguim: 9th tergite from above with a prominent median chitinized protuberence, its caudal margin gently concave and with short bristles and chitinized points. Pleural suture incomplete; pleural appendages as follows: outermost (see plate 17, figure 3), a broad, flattened lobe quite

densely covered with long hairs, these hairs rather stout except along the caudal margin where they are delicate, fringe-like; just inside this appendage is a cylindrical, chitinized arm directed toward the end of the 9th tergite, the apex evenly rounded; the largest of the pleural appendages is a flattened arm whose apex is notched and crenulated and fits into the notch of the 9th tergite; the penis is very long and slender, the central vesicle large and rounded.

Female.—About as in the ♂, the flagellar segments subannulate, the apical three-fifths of each segment being much paler than the basal portion; abdominal tergites 5-7 with a dark brown basal mark, segments 8 to the end brown; valves of the ovipositor short and sharply pointed. In one ♀, the entire tergum beyond segments 1-3 is almost entirely dark brown but this may be caused by the gravid condition of the abdomen which is greatly distended with eggs.

Holotype, ♂, Tokyo, Japan; August, 1912 (Vial 42).

Allotype, ♀, Tokyo, Japan; August, 1912 (Vial K).

Paratypes, 2 ♀, Tokyo, Japan; May 7, 1912 (Vial 34).

The specific name is that of an aboriginal Japanese race inhabiting the southern and central portions of the southern half of Nippon, facing the Pacific Ocean.

Tipula aino, sp. n.

Head blackish; præscutum and scutum dark coloured; abdomen yellow with two dorsal brown lines, one on either side of the broad ground stripe; wings with a slight gray tinge, costal region brown.

Male.—Length 16 mm.; wing 16.5-18.4 mm.

Female.—Length 19.4 mm.; wing 20.5 mm.

Male.—Palpi and the frontal prolongation of the head brown; antennæ with the three basal segments orange, segments 4 and 5 orange at the extreme base, entire remainder of the antennæ black; front, vertex and occiput dark coloured, blackish.

Mesonotum with the præscutum and most of the scutum uniformly dark brown with narrow darker stripes, one median and one on either side; scutum pale medially, lobes very dark; scutellum and postnotum dull yellow, the latter a little brown on the sides and in some specimens entirely dark. Pleura dull yellow

with a brown tinge on the propleura and anterior portions of the mesopleura. Halteres rather long, pale. Legs: coxæ and trochanters light yellow; femora orange-yellow the tip brown; tibiæ yellowish on the basal half, thence passing into brown; tarsi brown. Wings with a dark brown costal border, this including cells C, Sc., and the cephalic halves of cells R and 1st R_1; stigma even darker; most of cells R and M and the bases of cells R_2, R_3 and R_5 hyaline; remainder of the wings with a brownish-gray tinge. Venation as in plate 16, figure 3.

Abdominal tergites yellow with a broad brown stripe on each side, these stripes becoming confluent on segments 7 and 8; caudal margin of segments 3-6 narrowly brown; sternites dull yellow, the caudal margins of the segments a little darker. Male hypopygium: 9th tergite from above (see plate 16, figure 4), with the latero-caudal angles produced into strong spines between which is a small rounded lobe covered with hairs; suture between the tergum and sternum not clear; appendages of the pleural region viewed from the side (see plate 17, figure 5), two in number, the more ectad of which is a large, oval lobe, somewhat chitinized on its edges, its ventro-cephalic margin on the inside with a small oval knob provided with hairs; inner lobe very large, its caudal edge thickened and here provided at its tip with a comb of bristles directed caudad and an apical bunch directed dorsad; inner face of this appendage near its tip with a group of about 14 sharp points.

Female.—Ovipositor with the sternal valves very high, blade-like, the tips subacute; tergal valves very slender apically, the tip scarcely enlarged.

Holotype, ♂, Tokyo, Japan; April 13, 1912 (Vial 12).
Allotype, ♀, Tokyo, Japan; April 13, 1912 (Vial 12).
Paratypes, 5 ♂, 5 ♀; as follows:
Vial J; 1 ♀, Tokyo, Japan; August, 1912 (Cornell).
Vial 12; 2 ♂, 2 ♀, Tokyo, Japan; April 13, 1912 (Cornell).
Vial 40; 3 ♂, 2 ♀, Tokyo, Japan, August, 1912 (U. S. Nat. Mus.).

The specific name is that of an aboriginal Japanese race formerly occupying the northern half of Nippon, now confined to Yesso and the islands to the northward.

Tipula insulicola, sp. n.

Antennæ annulated black and yellow; thorax without indistinct brown stripes; wings light yellow with a prominent oval brown stigma; abdominal segments with a dark caudal margin.

Female.—Length 11.2 mm.; wing 11.3 mm.

Female.—Palpi and frontal prolongation of the head brown, the latter short and stout; antennæ with the three basal segments yellow, remaining segments with the basal two-fifths dark brown, the apices light yellow, these colours abruptly contrasted; front, vertex and occiput brown.

Præscutum dull yellow with three indistinct brown stripes of which the median one is broad, the lateral ones shorter and narrower; scutum with the lobes reddish; scutellum and postnotum dull yellow. Pleura dull yellow. Halteres dull yellow. Legs: coxæ, trochanters and femora light yellow; tibiæ brownish yellow, a little darkened at the tip; tarsi brown. Wings light yellow, cells C and Sc. a little brighter; stigma prominent, oval; an indistinct hyaline stripe across the wing beginning before the stigma and including cell 1st M_2. Venation, see plate 16, figure 6.

Abdominal tergites dull yellow, each segment narrowly but distinctly margined with dark brown all around, sternites very pale, almost white, each segment with the caudal margin narrowly brown; genital segment reddish yellow. Ovipositor with the tergal valves having a stout, enlarged base, the valves produced caudad into exceedingly slender points which are slightly expanded at their tips; tergal valves much shorter than the elongate, bladelike sternal valves which are directed caudad.

Holotype, ♀, Tokyo, Japan; August ,1912 (Vial K).

(To be continued.)

TWO NEW CALIFORNIA THAMNOTETTIX (HOMOPTERA).

BY E. D. BALL, LOGAN, UT.

While collecting in California, several years ago, a single specimen of a beautiful Thamnotettix was captured, but escaped from the net; not, however before its characters were pretty defi-

nitely fixed in mind. While collecting in another locality last year the same species was found and instantly recognized, and, like the former one, lost. This now became the chief object of search, and later it was captured in several different places. Its remarkable agility in escaping from a net probably being a reason it has not been captured before.

Thamnotettix pasadena, n. sp.

Size and form of *ursina* nearly, colour pattern resembling *collaris*, but still more highly ornamented. Rich brown, with head, saddle and anteapical band yellow. Length ♀ 6.5mm; ♂ 6mm.; width 1.5mm.

Vertex definitely obtusely angled, almost two-thirds as long as its basal width, slightly shorter than the pronotum, one-half longer at apex than against the eye, disc flat, the margins rounding to the front except at the conical apex, front broadly wedge-shaped, the lateral margins nearly straight, clypeus broad, slightly constricted. Elytra moderately long, strongly flaring behind. Venation weak, often obscure, with irregular reticulations in the anteapical cells, often especially emphasized along the claval and costal margins.

Colour—Vertex and face light yellow to yellowish ivory, eyes reddish or reddish brown, pronotum rich brown, the anterior submargin rich brown, with a row of irregular coalescing black spots, on either side a transverse median ivory mark; scutellum rich brown, sometimes with a medium light shield ornamented with two round dots. Elytra with the anterior two-thirds of claval areas rich yellowish ivory, the remainder brown, corium yellowish subhyaline, a brown cloud along the claval suture abruptly terminating just before the apex of clavus, where it expands and, uniting with the claval markings, forms a transverse brown band which narrows toward the costa and becomes slightly oblique, the reflexed apices of the elytra, including most of the apical areas smoky brown.

Genitalia—Female ultimate segment three or four times as long as the preceding, deeply angularly excavated from the lateral angles two-thirds of its depth, the bottom of the notch broadly

evenly rounding, whole segment curved around the pygofers until it appears to be only broadly and shallowly excavated on the median third. Pygofers long, but considerably exceeded by the elytra. Male, valve stout, obtusely angular with a strong median ridge either side of which the lateral margins are semicircularly depressed, giving the appearance of a waved margin and a notched apex, plates together bluntly spoon-shaped, their apices slightly parted and heavily clothed with coarse hairs; just visible above these are two long curved hooks.

Described from eight examples from California collected by the author in July and August, 1912. This is the most strikingly marked species in the genus, and, while the genitalia are slightly variable, its size and colour pattern will at once distinguish it.

Thamnotettix januata, n. sp.

Resembling *flavocapitata*, but smaller, darker and with a shorter vertex. Pale brown with the vertex light yellow. Length 4.75 mm.

Vertex twice wider than long, obtusely angled, one-fourth longer on middle than against the eye; disc convex in both diameters, the apex bluntly subconical; face convex, front long, narrow, wedge-shaped, clypeus long, the apex expanded. Pronotum broad and fully a third longer than the vertex. Elytra long, narrow and posteriorly appressed.

Colour—Vertex lemon yellow, sometimes with a faint brownish line just back of the anterior margin and parallel with the basal margin. Face and below pale straw. Pronotum olive brown, with the anterior margin narrowly lighter, scutellum washed with orange. Elytra olive brown with costal margin shading out to a subhyaline. Whole insect slightly coppery iridescent.

Genitalia — Female segment nearly twice wider than long, the whole posterior margin obtusely, angularly excavated with a narrow median strap-shaped tooth which extends beyond the lateral angles. Male, valve oval convex, plates together, slightly longer than wide with the apices slightly filamentous.

Described from four examples from San Francisco, Cal., collected by the author. A small and obscurely marked but quite distinct species.

THE CANADIAN ENTOMOLOGICAL SERVICE.

Thirty years ago, in 1884, the Canadian Government appointed a Dominion Entomologist to advise agriculturists and others regarding the control of insect pests. Two years later, on the establishment of the Experimental Farms' system, Dr. James Fletcher, who occupied the position, was attached to the new Branch of the Department of Agriculture in the joint capacity of Entomologist and Botanist, which position he occupied with conspicuous success until his death in 1908. The growth in importance of the two subjects necessitated their separation, and accordingly Divisions of Entomology and Botany were created. Dr. C. Gordon Hewitt was appointed Dominion Entomologist in 1909 and entrusted with the work of organizing the new Division of Entomology of the Experimental Farms' Branch of the Department of Agriculture with offices and laboratory at the Central Experimental Farm, Ottawa.

The urgent need of legislation in order to permit action to be taken to prevent the introduction into Canada and spread within the country of serious insect pests and plant diseases, was responsible for the passage of the Destructive Insect and Pest Act in1910. The still greater need of investigations on the insect pests affecting agriculture, forestry, and other branches of human activity, has led to the establishment of field or regional laboratories in different parts of Canada with trained Entomologists in charge to study the local problems.

Owing to the consequent expansion of the Entomological work along investigatory and administrative lines and the fact that such work did not constitute a necessary part of the work of the Experimental Farms' system, and executively was virtually distinct, the Entomological Service has now been separated from the Experimental Farms' Branch and has been constituted an independent Branch of the Department of Agriculture under the direction of the Dominion Entomologist. It is proposed to erect a building to provide offices and laboratories for the new Entomological Branch. Will correspondents kindly note that all official communications and publications should be addressed to "The Dominion Entomologist, Department of Agriculture, Ottawa."

This reorganization, which will also include the establishment of a national collection of the insects of Canada in the Canadian National Museum (the Victoria Memorial Museum) at Ottawa, under the care of the Dominion Entomologist, marks an important step in Canadian Entomology. It will result in a still greater development in the study of Canadian insects along scientific and practical lines.

The present organization of the Entomological Branch of the Canadian Department of Agriculture is as follows:

Dominion Entomologist and Chief.....C. Gordon Hewitt, D. Sc., F.R.S.C.

Chief Assistant Entomologist.....Arthur Gibson.

Assistant Entomologist in Charge of Forest Insect Investigations.....J. M. Swaine, M.Sc.,B.S.A.

Assistant Entomologist in Charge of Fruit Insect Investigations.....

Field Officers in Charge of Branch Laboratories:

G. E. Sanders, B.S.A., Entomological Laboratory, Bridgetown, N.S.

J. D. Tothill, B.S.A., and L. S. McLaine, M.Sc., Entomological Laboratory, Fredericton, N.B.

C. E. Petch, B.S.A., Entomological Laboratory, Covey Hill, Que.

Wm. A. Ross, B.S.A., Entomological Laboratory, Vineland Station, Ont.

H. F. Hudson, B.S.A., Entomological Laboratory, Strathroy, Ont.

Norman Criddle, Entomological Laboratory, Treesbank, Man.

E. H. Strickland, Entomological Laboratory, Lethbridge, Alta.

R. C. Treherne, B.S.A., Entomological Laboratory, Agassiz, B.C.

Field Officer for Forest Insect Investigations—R. N. Chrystal, B.Sc.

Inspectors and Assistants:

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Artist Assistant.....A. E. Kellett.

SUPERINTENDENTS OF FUMIGATIONS AND INSPECTORS:

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G. Manley, Niagara Falls, Ont. C. Wright, Windsor, Ont.
A. K. Leith, Winnipeg, Man. T. R. Waddington, North Portal, Sask.

Inspector of Indian Orchards.....T. Wilson.

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J. A. Letourneau; Miss J. McInnes; J. M. Moloughney; Miss E. Read.

Laboratory Assistant.....H. S. Fleming..
C. G. H.

BOOK REVIEW.

"MACROLEPIDOPTERA OF THE WORLD." By Prof. Dr. A. Seitz.

The issue of Volume II. of "Macrolepidoptera of the World," by Prof. Seitz, concludes the palearctic part of this great work, inasmuch as "Moths" (Tineidæ) and "Spinners" (Bombycidæ) are concerned. This edition is quite voluminous, containing fully 440 pages of text alone, irrespective of the index.

It represents, like volume I of "Butterflies," the most complete work of its kind known to-day. Above all, it contains figures of almost all the species of the Amur region of Turkestan, of the Caucasus, of Persia, of Syria, etc., many of these illustrations having appeared for the first time.

The text of this volume was compiled by nine authors, generally known as reliable authorities on Entomology. In this respect it certainly is astonishing that, notwithstanding the "many cooks," a pleasing uniformity has been obtained in regard to the text as well as to the plates, which uniformity does not appear in so marked a degree throughout Volume I.

The following figures will serve to give a good idea of the thoroughness of the volume in question:

In the Catalogue of Staudinger-Rebel, which appeared 13 years ago, 238 forms of Zygænidæ were enumerated, while "Seitz" lists 418 Zygænidæ of the palearctic region alone; of Saturnidæ "Seitz" has 122, against "Staudinger-Rebel's" 31. Furthermore, "Seitz" describes 329 Sphingidæ against 100 mentioned in the

"Staudinger-Rebel"-Catalogue; of Cymatophoridæ 86 are given in the "Seitz," while in "Staudinger's" work only 23 are shown; of Limacodidæ 46 are found in the "Seitz," whereas 15 are accounted for in the catalogue mentioned above.

All in all, this volume describes about 3000 species of Spinners (or varieties thereof), besides about 300 Sphingidæ. The number of coloured figures on 55 plates amounts to nearly 2400. When it is considered that the Moths and Spinners in the Staudinger do not quite number a thousand (in which, of course, some varieties are to be counted), one must readily admit that our knowledge of the palearctic region, with reference to Entomology, has been vastly increased by means of this gigantic work.

The reliability of the text, it must be said, can only be judged by those versed in this subject, or by specialists of the palearctic Fauna. The names of the authors, who contributed to this work, are so well known in the scientific world that one may readily place confidence in their statements and their scientific work.

By reading a chapter of the "Seitz," it will doubtless be ascertained that the numerous serviceable hints on collecting and rearing moths and caterpillars, are based upon personal experience; and that, furthermore, the author himself has personally bred the principal representatives of almost all the species, no matter whether they live in the Amur region, or in Syria, or in Mauretania, etc. He has, at any rate, observed them alive. The vast amount of information on food-plants, on methods of collecting, etc., are, no doubt, of the utmost importance to any collector; for is there any other book which mentions, e.g., at what hour the caterpillars of *Emydia striata* must be collected, in order to obtain them in greatest abundance? or is there one that cautions against delay in taking in the *Ognogyna* caterpillars, and admonishes us to collect them before the grass has grown so high that they are completely hidden from sight?

As in the first volume the plates are the most important features of the work. If anyone should presume the assertion to be too bold that it was left to the "Seitz" to show the world what really good figures are, he certainly ought to make a critical comparison with other works of this kind. The average collectors are, of course, satisfied with the illustrations in the new "Berge," and

everybody admits that the butterflies illustrated therein, in that complex mixed company, in which caterpillars, plants and butterflies are placed together upon a tinted background, present an attractive picture. But how do these "pictures" compare with those of the "Seitz" from a scientific viewpoint. If, for instance, a *Batis* in the "Seitz" be compared with the corresponding figure of a *Batis* in the " Berge " (Plate 28, figure 49e), a vast difference manifests itself. This also applies to the illustrations of the Vienna Emperor Moth. Looking at Plate 29 of "Berge," without comparing with nature, one is well pleased with the figure of "pyri," fig. 1b; but a comparison with the figure in the "Seitz," table 31b, discloses the mistakes of the former at once. The borders and the ground colour of the wings in the "Berge" are yellowish red, whereas, in reality they are *grey*, as correctly depicted in the "Seitz." Of course, the representation of *pyri* in the "Seitz" does not make a brilliant showing, as only one-half of the insect is illustrated, and is furthermore not as finely elaborated, in order to be in accordance with real nature, and because it does not show any head. But by comparing it with a specimen in one's collection, it is at once evident that, viewed from above, *pyri* seems to be headless, as do also *spini* and *pavonia*. The figure in the "Berge," which shows a big head, is a mere phantasm, while the half figure in the "Seitz" is genuine nature. It is, therefore, to anybody who earnestly intends to work in Entomology far more valuable, than the "trimmed-up" and "pleasingly grouped" illustrations of amateur-works.

This apparently trivial point has been mentioned quite intentionally, as there is a species closely resembling *pyri*, namely, *atlantica*, in which, viewed from above, the forehead is clearly to be seen.

To convey an idea of the number of plates contained in the different volumes of "Seitz," so far printed, it may be mentioned that up to last year they already exceeded 500.

As it is, the author has unquestionably earned well-deserved praise with the eminently satisfactory issue of the "Second Volume of Macrolepidoptera." In the meantime Volume III has also been finished, and Volume IV is nearly completed. It goes

without saying, that these new publications are just as excellent in every particular as the two former ones.

"Macrolepidoptera of the World" is also published in a separate English Edition by the "Verlag des Seitz'schen Werkes," Stuttgart, Germany. Wilhelm Lehr, Baltimore, Md.

The officers of the London Biological Club, whose names were omitted from our notice in the May number (p. 184), are as follows: President, Dr. H. W. Hill; Vice-President, Dr. S. Wolverton; Curator, Mr. J. F. Calvert; Secretary-Treasurer, Mr. J. W. Noble.

THE OCCURRENCE OF THE HOUSE CENTIPEDE, *SCUTIGERA FORCEPS* RAF., IN CANADA.

When retiring for the night on April 15th I was most interested to capture in my bathroom at the hotel in which I was staying in Toronto, an adult female specimen of this remarkable myriapod, whose occurrence in Canada has not been previously recorded, so far as I am aware.

It is a southern species, its normal habitat being the Southern States. As early as 1849 it was observed in Pennsylvania, and it has gradually spread northward. Mr. R. V. Chamberlin informs me that the most northerly locality which he has recorded from it is Boston, Mass., and that it also occurs at Ithaca, N. Y.

The captured specimen, after enabling me to study its method of capturing flies, died a few days after my return to Ottawa. *Scutigera* feeds on house-flies, roaches and other household insects, springing on them and imprisoning them in its unusually long legs. An account of its habits is given by Marlatt in Howard & Marlatt's "Household Insects" (Bull. No. 4, N. S. Div. Ent., U. S. Dept. of Agric., pp. 47-50, 1896. C. Gordon Hewitt.

Professor Walter C. O'Kane, Entomologist to the New Hampshire Experiment Station, and Professor of Economic Entomology in New Hampshire College, has been elected Professor of Zoology and Entomology at the Ohio State University, from which he graduated in 1897. He is widely known as the author of an excellent work on injurious insects, published in 1912.

A NEW WASP FROM THE PHILIPPINE ISLANDS.

BY T. D. A. COCKERELL, BOULDER, CALIF.

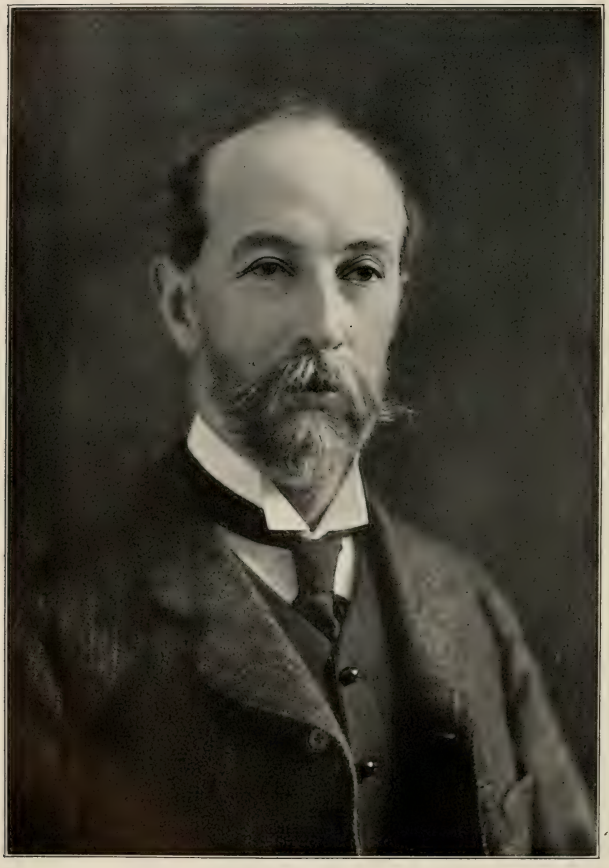
Cerceris angularis, n. sp.

♀.—Length about 16 mm., anterior wing a little over 14; black, with the abdomen largely red; no yellow markings, except that a high keel between the antennæ is pale yellow, and the mandibles have a broad, dull straw-coloured longitudinal band on the basal half; head very large; eyes converging above; vertex and cheeks very broad, with strong punctures on a shining ground; ocelli close together; face covered with appressed silvery hair; antennæ black, apical joint partly red; clypeus not keeled, but transversely obtusely elevated in middle, the part above the elevation dull and feebly punctured, that below it smooth and shining, the lower margin indistinctly bidentate, with a little round tubercle in the submarginal region above each tooth; mandibles with an enormous triangular shining tooth on inner side about the middle; molar space wanting; thorax dull, with large but not very deep punctures, those on the mesothorax in grooves, the margins of the grooves forming longitudinal ridges, especially in the anterior middle region; area of metathorax with weak basal plicæ, and beyond with oblique plicæ, which arch over and join in the middle line, where they become transverse; under side of thorax with fine silvery tomentum; mesopleuræ grooved, extended into a great angular projection or tooth, the sharp edge of which is vertical; legs black; tegulæ black; wings dark fuliginous, venation normal; abdomen with the joints beyond the second not constricted; punctures distinct but sparse; first segment black with an apical red band; second and third segments bright ferruginous; remaining segments black, except that fourth is red at extreme sides; venter with very minute punctures, and scattered larger ones; fifth ventral segment depressed in middle, sixth deeply incised; pygidial plate finely rugose, narrow, truncate.

Hab.—Mt. Makiling, Luzon (Baker). Structurally somewhat allied to *C. elizabethæ* Bingham, but that is a much smaller species, with different colours. In many ways *C. vafra* Bingham is apparently allied, but it is larger, with a different clypeus, etc.

FORMER students of Professor John Henry Comstock have raised a fund, to be known as the Comstock Memorial Library Fund, which is to be presented to Cornell University for a permanent memorial of Professor Comstock's forty years of distinguished service as instructor and professor of entomology. He is to retire from active teaching as a member of the faculty next June, at the age of sixty-five. The ceremony of presentation will take place on June 13.—[*Science.*

Mailed June 10th, 1914.



HENRY HERBERT LYMAN, M.A

The Canadian Entomologist.

Vol. XLVI. LONDON, JULY, 1914 No. 7

HENRY HERBERT LYMAN, M.A.

The appalling calamity that befell the steamship "Empress of Ireland" in the River St. Lawrence near Father Point shortly after midnight on Friday, May 29th, was acutely brought home to the older members of the Entomological Society of Ontario by the sad tidings that Mr. H. H. Lyman and his wife were among the thousand and more who were lost. For some few days we hoped against hope, but no trace of them has been found and there is not a vestige to show in what manner death came upon them; it seems most probable that they were drowned in their stateroom before they had time to escape. Mr. Lyman was to have sailed a fortnight earlier, but owing to the pressure of business matters he postponed his departure with so sad a result.

Mr. Lyman was born in Montreal on the 21st of December, 1854 and received his early education at the High School and West End Academy. At McGill University he took the Arts Course and proceeded to the degree of B.A. in 1876, winning the Logan medal in Geology and Natural Science, and received his M.A. degree in 1880. On completing his college career he entered his father's firm, Lymans, Clare & Co., wholesale chemists and druggists in Montreal; in 1885 he became a partner in the business, whose name had been changed to Lyman, Sons & Co. On the death of his father he became senior partner and president of Lymans, Limited, which includes the branch house in Toronto. His position in these important concerns manifests his remarkable business capacity and the attention he must have paid to their affairs. The houses are widely known throughout Canada and bear the highest reputation for upright dealing, energy and enterprise.

Though much engrossed with the management of a very large business establishment, which demanded a close attention to innumerable details, Mr. Lyman found time for an active interest in many other things. In 1877 he joined the 5th Battalion of the

Canadian volunteer force (now the Royal Scots of Canada), and rose from Ensign to Major in 1885, retiring with that rank in 1891. He was a life governor of the Montreal General Hospital; Treasurer and Vice-President of the Graduates' Society of McGill University; Fellow of the Royal Geographical Society and of the Royal Colonial Institute; one of the organizers of the Imperial Federation League in Canada and a member of the deputation which waited upon Lord Salisbury's administration in 1886, asking that an Imperial Conference representing the whole British Empire should be summoned. The Conference was held during the following year. He was also a Director of the British and Colonial Press Service. Though little interested in local politics he was an ardent Imperialist and considered that the perpetual unity of the Empire far surpassed in importance all other political questions; he advocated Imperial preferential trade and believed that Canada should bear its share of the burden of Imperial defence.

To turn to a different aspect of his life, the one in which our readers are more interested—we learn that when only eight years of age he began to observe insects and their ways, and when a boy of twelve commenced to form a collection of Lepidoptera, which has now become one of the finest and most extensive in Canada. On Jan. 5th, 1875, Mr. Lyman became a member of the Entomological Society of Ontario by joining the Montreal Branch. At the following meeting he exhibited a case of butterflies from Illinois, following a custom which has always been characteristic of the Montreal meetings. These exhibits usually led to discussions in which Mr. Lyman took an active part and spared no pains in arriving at correct conclusions, studying the original descriptions and at times taking the specimens to the United States or the British Museum for final determination. He would never jump at conclusions but, sparing no time or trouble, would not rest satisfied till certainty was assured.

His first paper was presented at the meeting on Oct. 5th, 1875, being a description of the larva and pupa of *Grapta interrogationis*; this was followed a few months later by a list of Diurnal Lepidoptera taken at Portland, Maine (published in the Can. Ent., XII, pp. 7–9). For nearly ten years he spent his annual summer holiday on the Atlantic Coast, where he added largely to his col-

lections and developed his love for the butterflies which he took great delight in rearing through all their stages. The first article from Mr. Lyman's pen which appeared in the Canadian Entomologist (Volume VI, page 38), is in the form of a letter asking questions about several butterflies found at Portland, Maine. In the same volume (page 158), he described the curiously marked egg of *Gastropacha americana*. From the 19th to the 44th volume, none have been without at least one article from his pen, and he lately expressed his regret that he failed to contribute last year to Vol. XLV. In addition to his articles in this magazine, he wrote several of a more popular character for the Annual Reports of our Society, and contributed a few also to "Entomological News." A list of his more important papers is given below.

The third annual meeting of the Montreal Branch was held at Mr. Lyman's residence on May 7, 1876, at which the minute book records that "he exhibited his fine collection of local and exotic insects." This was the beginning of a long series of gatherings under his hospitable roof; during thirty-seven years a large proportion of the monthly meetings were held there, and were thoroughly enjoyed by the members and occasional visitors from a distance. They were made especially interesting at times by his delightful accounts of visits to scientific gatherings in the United States and Europe as well as in Canada; he would recount the proceedings, often with a good deal of humour, and tell of the eminent men whom he met. In the course of years he gathered together a large collection of books on the Lepidoptera of North America chiefly, and these he was always most kind in lending to his fellow members when they required to consult them.

While interested in everything connected with the Lepidoptera of this continent, he paid little attention to the "Micros," but was always keen to acquire specimens for study and comparison of such genera as Colias, Argynnis, Grapta, Chionobas, Haploa, Hyphantria, Papaipema, Xylina and Hepialus. His papers on these subjects will always be found of value and interest.

On June 5th, 1877, he was elected Vice-President of the Montreal Branch and four years later he became President holding the higher office for two years; in 1888 he again became President and retained the position till 1899.

In 1895 he was elected Vice-President of the parent Society and in 1897 became President, holding this highest place in the Society for the usual term of two years, to the great satisfaction of the members. He rarely missed one of our annual meetings, and as a permanent Director of the Society took an active part in the management of its affairs. His interests, however, were not confined to his native land. Many years ago he joined the American Association for the Advancement of Science and was recently much gratified at being elected a Fellow; he used to say that an amateur who did good work was really more deserving of honour and recognition than a professional Entomologist who received pay for his work. He was also a Fellow of the Entomological Society of America and of the Entomological Society of London, England; an honorary member of the New York Entomological Society and the Cambridge Entomological Club; for some time he was Vice-President of the Natural History Society of Montreal. His last official act was the reading of his report as delegate from our Society to the Royal Society at the meeting in Montreal on Wednesday, May 27, the day before he started on his fatal voyage.

For a long time past Mr. Lyman's friends have been much distressed by his increasing deafness, which of late had almost become total. Conversation with him could only be carried on with the aid of an ear-trumpet or by writing. In spite of this severe disability, he was always bright and cheerful, full of innocent fun and enjoying a harmless joke. He travelled about a great deal, attending scientific meetings and other gatherings, among others the International Congresses of Entomology at Brussels and Oxford, which he seemed to enjoy, though latterly he could not hear a word of the papers and discussions.

The writer and many friends were greatly pleased as well as surprised when he informed us that he was about to be married. Since the death of his mother to whom he paid devoted attention during a long period of weakness and infirmity, he had been living a somewhat lonely life. Two years ago, in March 1912, he was married to a daughter of the Rev. William Kirkby, of New York, formerly rector of Collingwood, Ontario. She attended with her husband the Jubilee meeting of our Society at Guelph last August

and charmed all who had the pleasure of spending any time in her company. It seems inexpressibly sad that our two friends should have had so short a period of happy married life, and have ended their days together in a tragedy so sudden and so awful.

C. J. S. B.

Mr. Lyman's Published Papers.

To the Canadian Entomologist he contributed sixty articles, among which the following may be mentioned:—

Notes on *Colias christina*, Vol. XVI, 5.

The North American *Callimorphas*, Vols. XIX, 181, with plate, and XXI, 231.

Can Insects survive freezing? Vols. XXIV, 1, and XXX, 287.

Pamphila manitoba and its varieties, XXIV, 57.

Preparatory stages of *Nemeophila scudderi*, XXV, 248.

Occurrence of *Hepialus thule* at Montreal, XXV, 297 and XXXIX, 397.

The larger species of *Argynnis* and the mystery of their life history, XXVIII, 143.

Preparatory stages of *Erebia epipsodea*. XXVIII, 274.

Life history of *Colias interior*, XXIX, 249.

Life history of *Xylina Bethunei*, XXXIII, 1.

What is a Genus? XXXIV, 187.

New *Gortynas*, XXXVII, 305 (with plate).

A North American Entomologists' Union, XXXVIII, 1.

Type and Typical, XL, 141.

Recent work among the Borers, XL, 249.

Notes on N. A. *Graptas* in the British Museum, XLIII, 418.

The second International Congress of Entomology, XLIV, 370.

In the Annual Reports:—

No. 23, p. 32. A Trip to Mt. Washington.

No. 32, p. 57. Fall Web Worms, with plate of 33 figures.

No. 32, p. 61. Notes on *Danais archippus*.

No. 37, p. 39. A hunt for a borer.

No. 39, p. 145. Life history of *Euchetias oregonensis*.

No. 40, p. 46. Origin and diffusion of Entomological Errors.

In 29th report, p. 17. President's Annual Address delivered on the occasion of the 25th Anniversary of the Montreal Branch.

In Entomological News, Vol. XVIII, p. 420, is an able article on *Thecla calanus* and *T. edwardsii* (with the footnote that it was read before the Ent. Soc. of Ontario at Guelph, July 4, 1907).

In Vol. VII, 172. On occurrence of *Chionobas tarpeia* in North America.

Several short items also appear, including one regarding *Erebia discoidalis* in the first volume, p. 146.

NEW OR LITTLE KNOWN SPECIES OF APHIDIDÆ.

BY JOHN J. DAVIS, BUREAU OF ENTOMOLOGY, WASHINGTON, D. C.

(Continued from p. 173.)

Symdobius albasiphus, n. sp.

This very interesting plant-louse was first taken by the writer on white oak (*Quercus alba*), at Elgin, Illinois, August 30, 1910. The past year (Sept. 10, 1913), the wingless females were found quite common on white oak at Lafayette, Indiana, and October 8, 1913, at the same place, the wingless oviparous females and winged males were observed. In all cases the plant-louse was found on the leaves near the leaf petiole, usually on the under surface of the leaf, and invariably attended by the ant, *Cremastogaster lineolata* Say.* We have found only the apterous forms of the viviparous generation, but Mr. J. T. Monell collected three winged individuals of this species on oak petioles at Mine la Motte, Missouri, June 28, 1890, and our description of this form is taken from these specimens and the notes accompanying them, through the kindness of Mr. Monell. I have recently received an oviparous female of this species from Mr. A. C. Baker, accompanied by the following note: "On white oak, Vienna, Va., Oct. 4, 1912. Ants had built a mud nest over the aphids to protect them. This nest was on the upper side of the leaf, covering nearly half of it." The first, and so far as we are aware, the only published reference to this species is by Dr. Thomas in the Eighth Report of the State Entomologist of Illinois (1879, p. 118), where the apterous females are described as *Lachnus quercifoliæ* Fitch, from specimens collected on white oak

*Kindly determined by Dr. W. M. Wheeler.

at Carbondale, Illinois, in August. As will be readily noticed, this is not the species designated *quercifoliæ* by Fitch.

Although apparently not a typical member of the genus *Symdobius*, the species under consideration seems to best belong there.

Wingless viviparous female:

General colour dark brown. Head and prothorax brownish yellow to light reddish brown; mesothorax usually concolorous or but slightly darker; metathorax with a dark brown longitudinal area on each side, the remaining areas greenish brown; abdomen dark brown with irregular paler greenish brown areas, apparently due to the pale greenish young within the body; sometimes the metathorax and entire abdomen shining dark brown, almost black. Body sparsely clothed with *Chaitophorus*-like hairs, more prominent at posterior end.

Eyes maroon colour. Antennæ scarcely more than one half the body length; almost naked; segment III longest, and the filament of VI shorter than the basal portion of that segment; only the usual distal sensoria on V and base VI; segment I and II dusky, III and IV pale, with a barely noticeable duskiness at tip, V pale and dusky at tip, VI, base, with the basal half pale, the distal half and all of filament VI blackish (Pl. XVIII, fig. 49). Beak pale yellow, the extreme tip dusky; reaching to the coxæ of the second pair of legs. Two fore pairs of legs whitish, the joints often dusky and the distal half of tarsus blackish; hind pair blackish, excepting the distal half of tibia, which is paler. In life the cornicles are rather conspicuous because of their pure white colour, as though covered with a heavy white pulverulence; quite small, the opening narrow; slightly cone-shaped, and inconspicuous in mounted specimens (Pl. XVIII, fig. 50). Cauda a rather inconspicuous rounded protuberance, pale yellowish and hairy; anal plate bilobed, moderately deeply emarginate and the lobes robust and hairy (Pl. XVIII, fig. 51).

Measurements from six individuals in balsam: Length of body 1.4 to 1.9 mm., average 1.6 mm.; width 0.8 to 1.0, average 0.9 mm.; antenna I, 0.069; II, 0.052; III, 0.191 to 0.278, average 0.234; IV, 0.139 to 0.182, average 0.157; V, 0.157 to 0.191,

average 0.174; VI, base, 0.113 to 0.139, average 0.125; VI, filament, 0.070 to 0.087, average 0.080; total average length 0.891 mm.

Winged viviparous female:

Head (Pl. XVIII, fig. 52) and thorax dark brown to blackish. Abdomen brown with a central longitudinal whitish yellow stripe. Body very sparsely hairy, the tip of abdomen, including cauda and anal plate, more noticeably hairy. Antennæ shorter than body; relative antennal lengths as in the apterous; segment III bearing 7 to 8 rather large circular sensoria in a row, the usual distal ones on V and base VI (Pl. XVIII, fig. 53). Wings hyaline, veins narrow, an almost imperceptible duskiness at tips of veins; terminal branch of media variable, sometimes branching near apex of wing and sometimes nearer to the point where this vein first branches. Cornicles whitish, slightly narrower at tip than at base, about as long as broad and quite inconspicuous in mounted specimens. Cauda broadly rounded and anal plate bilobed as in the apterous form (Pl. XVIII, fig. 54).

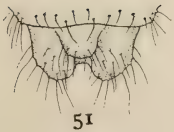
Measurements from three specimens in balsam, the bodies somewhat shrivelled. Average length of body 1.16 mm.; average width 0.57 mm.; length of wings approximately three times their width; antenna I, 0.06; II, 0.05; III, 0.261 to 0.295, average 0.278; IV, 0.156 to 0.174, average 0.165; V, 0.182 to 0.200, average 0.191; VI, base, average 0.122; VI, filament 0.078 to 0.096, average 0.087; average total length 0.953 mm.

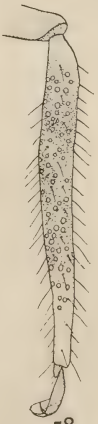
Immature:

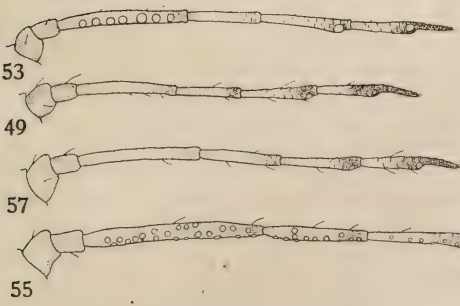
The young is whitish green with pale olive green markings, as follows: A U-shaped marking the bottom of which extends to and usually includes the first abdominal segment and the top of which reaches the prothoracic segment. A longitudinal area on each side of the abdomen and about in line with the cornicles, but not quite reaching to them. Another marking just posterior to the cornicles. Cornicles white as in the adult.

Winged male:

Head and thorax dark brown to blackish. Abdomen pale pea-green with a dorsal median longitudinal marking and an area







SYMDOBIUS ALBASIPHUS, n. sp.

around each cornicle of a paler green. Body with only a few sparsely-placed hairs.

Eyes dark red. Antennæ a little more than half the body length; relative lengths of segments as in other forms: I and II pale dusky, III, IV, V and base of VI pale with blackish tips, and all of VI filament black; segment III bearing 23 to 30 irregularly-placed circular sensoria, IV with 8 to 13, V with 5 to 9, not including the usual distal one, and VI base with 2 to 4, usually in a row, exclusive of the usual distal ones; sparsely hairy (Pl. XVIII, fig. 55). Fore pair of legs pale, with the tip of tarsus blackish; middle pair similiarly coloured, but with the femur dusky towards the tip; hind pair with femur blackish except at base, tibia blackish except towards tip, and apex of tarsus black. Wings as in the winged viviparous female (Pl. XVIII, fig. 56). Cornicles as described for the other forms. Cauda pale green, covered with a rather heavy pulverulence, hairy, and similar in shape to those of the other forms. Anal plate rounded (not bilobed as in the viviparous forms) and hairy.

Measurements from six individuals mounted in balsam, as follows: Length of body 1.32 to 1.82, average 1.51 mm.; width 0.46 to 0.58, average 0.54; length of wing, average 2.28 mm.; width, average 0.82 mm.; antenna I, 0.061; II, 0.054; III, 0.296 to 0.322, average 0 315; IV, 0.174 to 0.217, average 0.197; V, 0.200 to 0.235, average 0.217; VI, base, 0.122 to 0.148, average 0.138; VI, filament 0.087 to 0.104, average 0.092; total average length 1.074.

Wingless oviparous female:

Body mottled with green and black, but to the naked eye it appears to be largely blackish. Head and first two thoracic segments of a light reddish to pinkish tint; remainder of body blackish, with a more or less distinct median dorsal line of pale yellowish green or whitish green, sometimes even with a faint pinkish tint. Laterad of the median paler area are dots of the same colour intermixed with the black; also a pale area around the cornicles. Body moderately sparsely clothed with medium-length hairs as in the wingless viviparous female.

Eyes maroon red. Antennæ approximately one-half the length of the body; relative lengths of segments as in the other

forms; very sparsely hairy; segment I concolorous with head, II pale with a slight duskiness, III, IV, V and base VI pale with blackish tips, VI filament black; sensoria as in the wingless viviparous female (Pl. XVIII, fig. 57). Beak reaching to coxæ of second pair of legs. Fore pair of legs entirely pale, excepting distal end of tarsus; middle pair with femur dusky to blackish except at base; hind pair as the middle pair, but the tibia dusky except at tip; hind tibiæ noticeably swollen and bearing many irregularly placed circular sensoria (Pl. XVIII, fig. 58). Cornicles white as in other forms. Cauda pale with greenish tint, anal plate rounded as in the male.

Measurements from six individuals, as follows: Length of body 1.63 to 2.01, average 1.81 mm.; width 0.96 to 1.12, average 1.04 mm.; antenna I, 0.069; II, 0.060; III, 0.269 to 0.313, average 0.290; IV, 0.148 to 0.200, average 0.179; V, 0.174 to 0.209, average 0.186; VI, base, 0.113 to 0.139, average 0.130; VI, filament 0.070 to 0.090, average 0.078; total average length 0.992 mm.

Egg:

The egg is very pale greenish when first laid, later changing to black.

Aphis pseudobrassicæ, n. sp.

This species was first received by us from Mr. W. J. Schoene, who found occasional specimens on cabbage at Geneva, New York, July 15, 1912. Later in the year (Nov. 20, 1912), a correspondent sent us specimens collected at Evansville, Indiana, with the note that they were abundant on kale and mustard, and that "these same insects have been bothering our turnips and turnip greens, destroying large portions of the patches. It does not bother on spring greens, only on fall crops." In the lot received from Evansville were *Myzus persicæ* and *Aphis pseudobrassicæ* in about equal numbers.

The past fall (September and October, 1913) we have found it at Lafayette, Indiana, abundant on radish and turnip and in the insectary it bred rather freely on rape, although the two former seem to be the preferred host plants. Mr. F. B. Paddock has also found it abundant on turnip at College Station, Texas, and has kindly forwarded specimens to us. No doubt further collections

will show this species to be generally distributed over the country and since it closely resembles *Aphis brassicæ* it has likely been mistaken for this species in some instances.

The fact that the winged viviparous female bears sensoria on segment IV. of the antenna, alone separates it from *brassicæ*. The sexes have not been found and our present knowledge leads us to believe that the more usual means of passing the winter is as viviparous females.

Wingless viviparous female. (Fig. 21).

Entire body pale whitish green, head slightly dusky. Abdomen with a longitudinal row of impressed dots along each side in line with the cornicles; also on each side of the median dorsal line is a row of transverse shining areas with a reticulated surface, those on the last four or five segments usually united; and a similar row of smaller areas on each side. These shining reticulated areas contrast with the rest of the body which is dull and very slightly pulverulent. Thoracic segments with similiar transverse areas. In specimens just molted the entire body appears shining and reticulated.

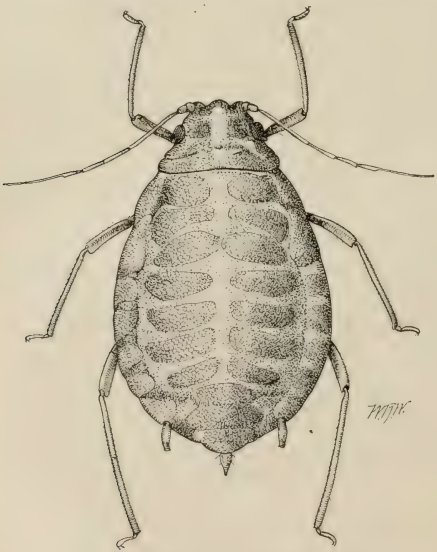


Fig. 21.—*Aphis pseudobrassicæ*, wingless viviparous female.

Eyes black. Antennæ blackish excepting segments I, II and basal half of III which are pale; reaching a little beyond the

middle of the body; segment III longest, it being a half to three fourths longer than VI filament; segments V and VI base with the usual distal sensoria. Beak reaching to coxæ of second pair of legs. Legs pale with dusky joints, the tips of the tibiæ and all of the tarsi black. Cornicles pale with the tip dusky, slightly swollen towards the tip and constricted just before the apex, and noticably longer than the cornicles of *A. brassicæ*. Cauda conical, and dusky to blackish.

Measurements, as follows (averages from six individuals): Length of body 1.66 mm.; width 1.00 mm.; cornicle 0.226 mm.; cauda 0.140 mm.; antenna I, 0.080; II, 0.061; III, 0.399; IV, 0.202; V, 0.160; VI, base 0.122; VI, filament 0.287; total average length 1.311 mm.

Pupa.

Head dusky, remainder of body cream colour or with a faint greenish tint, and covered with a slight whitish pulverulence, excepting the shining areas which are covered with a noticeable reticulation, and which are placed as follows—a row of oval or transverse areas on each side of the median dorsal line and a row of smaller and more circular ones laterad of these on each side, about in line with the cornicles.

Eyes black. Antennæ pale dusky, the distal ends of segments being more so, relative lengths of segments as in the winged female. Wing pads blackish. Legs pale dusky with the joints, distal end of tibiæ and tarsus blackish. Cornicles dusky, paler at middle, blackish at tips, and similar in shape to those of the wingless female.

Winged viviparous female. (Fig. 22).

Head and thorax black. Abdomen pale apple green with a tint of nile green and a row of three black spots on each side anterior to the cornicles; a row of small impressed dots on each side dorsad of the larger spots; and in addition a few scattered inconspicuous dusky markings on the dorsum, and the last three segments with black transverse, dorsal median markings.

Eyes black. Antennæ black; almost reaching to base of cornicles; segments III and VI filament subequal; segment III with 19 to 26 moderately tuberculate circular sensoria irregularly placed,

IV with 6 to 10, often more or less in a row, V and VI base with the usual distal sensoria and not infrequently segment V bears one or two near the base (Fig. 22a). Wings with black and rather conspicuous veins, and the terminal branch of the media nearer the

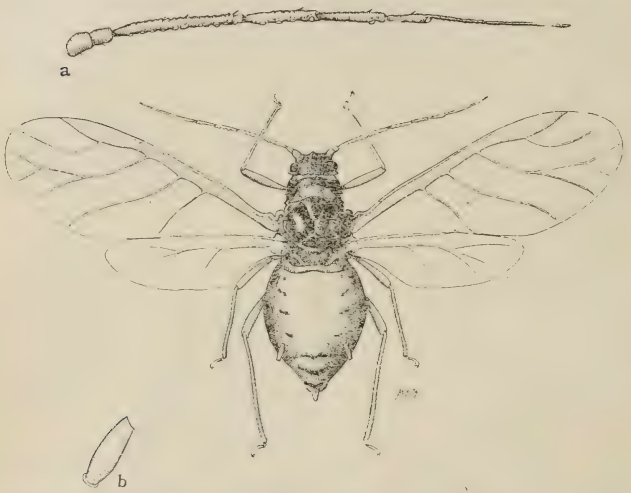


Fig. 22.—*Aphis pseudobrassicæ*, winged viviparous female; a, antenna of same, enlarged; b, cornicle of same, enlarged.

apex of wing than where it first branches. Legs with femur pale brownish to blackish, tibia pale brownish with tip black and tarsus black. Cornicles dusky, paler at tips, and shaped as in the wingless form (Fig. 22b). Cauda concolorous with the abdomen or paler. Measurements as follows (averages from six individuals): Length of body 1.4 mm.; width of body 0.66 mm.; length of wing 2.4 mm.; width of wing 0.9 mm.; antenna I, 0.069; II, 0.061; III, 0.363; IV, 0.191; V, 0.165; VI, base 0.126; VI, filament 0.358; total average length 1.333 mm.; length of cornicles 0.172 mm.; of cauda 0.134 mm.

Descriptions made from specimens collected on radish, turnip, and rape, at Lafayette, Indiana.

Directions for Sending Living Aphids.

It is desirable, in sending aphids for determination, that living individuals be submitted when possible. We have found the following method to be the most satisfactory of several tried:

Place a portion of the plant bearing the aphids in a glass vial and with it a strip of filter paper, the size depending on the size of vial and quantity of foliage placed within it. The vial is then tightly stoppered with a cork and placed in a mailing tube or substantial box for mailing. Always have the stem of the plant and the end of the filter paper sufficiently long so that they will be held by the cork; otherwise the loose foliage and twigs will shake about and may crush the aphids. By this method we have shipped living specimens 1,700 miles and had them reach their destination in excellent shape. Tin salve boxes also make excellent shipping boxes for living aphids. Shipments of this nature should always be accompanied by full data, such as name of food plant, locality, date, part of plant affected, and collector.

All of the illustrations in this paper are by Dr. Henry Fox, excepting figures 10, 21, and 22, which are by Mr. W. R. Walton and figures 43 and 45 to 48 inclusive of plate VII and all of plate XVIII, which are the author's.

Explanation of Plates.

Plate II. *Macrosiphum creelii* n. sp.—Figure 1 antenna, and 2 cornicle of wingless viviparous female; 3 head and 4 antenna of winged viviparous female.

Macrosiphum coryli n. sp.—5 head, 6 antenna and 7 cauda of wingless viviparous female; 8 antenna, 9 wing, and 10 cornicle of winged viviparous female.

Plate IV. *Macrosiphum venæfuscæ* n. sp.—11 head, 12 antenna and 13 cauda of wingless viviparous female, 14 head, 15 antenna, 16 wing, and 17 cornicle of winged viviparous female; 18 antenna of winged male; 19 antenna and 20 hind tibia of wingless oviparous female.

Plate V. *Macrosiphum tiliæ* Monell.—21 head, 22 antenna and 23 cornicle of wingless viviparous female; 24 antenna of winged male; 25 hind tibia of wingless oviparous female.

Myzus lycopersici Clarke.—26 antenna of wingless viviparous female; 27 antenna, 28 head, 29 cornicle and 30 cauda of winged viviparous female; 31 antenna of winged male; 32 antenna of oviparous female.

Plate VII. *Myzus lycopersici* Clarke.—33 hind tibia of wingless oviparous female.

Rhopalosiphum howardii Wilson.—34 antenna of wingless viviparous female; 35 head, 36 wing, 37 cornicle, 38 cauda and 39 antenna of winged viviparous female; 40 antenna of winged male.

Eulachnus rileyi Williams.—41 antenna of wingless viviparous female; 42 head, 43 antenna, 44 beak, 45 wing and 46 hind tarsus of winged viviparous female; 47 antenna of winged male, 48 hind tibia of wingless oviparous female.

Plate XVIII. *Symdobius albasiphus* n. sp.—49 antenna, 50 cornicle and 51 cauda and anal plate of wingless viviparous female; 52 head, 53 antenna and 54 cauda and anal plate of winged viviparous female; 55 antenna and 56 wing of winged male; 57 antenna and 58 hind tibia of wingless oviparous female.

REPORT ON A COLLECTION OF JAPANESE CRANE-FLIES (*TIPULIDÆ, DIPTERA*).

BY CHARLES P. ALEXANDER, ITHACA, N. Y.

(Continued from p. 211.)

Tipula nipponensis, sp. n.

Head yellowish; thorax yellow with brown stripes; abdomen with the caudal margin of the segments broadly brown; wings variegated gray, brown and hyaline.

Male: Length 12.8 mm.; wing 13.6 mm.; antennæ about 4 mm.

Female: Length 13–14.1 mm.; wing 14.2–15.2 mm.

Male: Palpi brown, the terminal segment very long and pale; frontal prolongation of the head very short and stout, yellowish; antennæ, segments 1 and 2 yellow, flagellar segments with the somewhat enlarged base dark brown, the remainder of each segment dull yellow; front, vertex and occiput dull yellow, the sides of the vertex and the genæ dark brown.

Pronotum pale; mesonotum dull yellow with dark brown stripes, the median one bisected by a pale line, lateral stripes short.

very close to the median stripe; scutum with the lobes brown; scutellum and postnotum yellowish medially, the sides dark brown, a narrow indistinct median line. Pleura yellowish with brown blotches as follows: On sides of the propleura; a large blotch on the mesoepisternum and mesosternum; a very dark spot on the dorsocephalic angle of the mesepimerum, a dark blotch at the base of the halteres. Halteres paler. Legs, coxæ dull yellow with the base on the outer side tinged with brown; trochanters yellow; femora yellow, the tip brown; tibiæ light brown, tarsi dark brown. Wings with a light gray suffusion, cells C and Sc a little lighter, yellowish; stigma brown; hyaline spots as follows: In front of and beyond the stigma, cell 1st M_2, a large blotch in the end of cell M and a spot in cell 1st A near the end of vein 2nd A; veins Cu and 2nd A narrowly seamed with brownish. Venation (see plate XVI, figure 2).

Abdominal tergites with the basal third yellowish, apical two-thirds brown; pleural line conspicuously dark brown; sternites light yellow, each segment with a narrow, transverse subbasal brown band. Male hypopygium: 9th tergite from above narrow, not nearly as wide as the 8th tergite, its lateral angles rounded, its caudal margin deeply and broadly notched. Pleural appendages from the side (see plate XIX, fig. 2). A more dorsal and ectal fleshy lobe which is directed backward, this lobe cylindrical, tapering, provided with sparse long hairs; entad and ventrad of this lobe is a large bifid appendage whose caudal arm is feebly chitinized, pale, with abundant hairs, the inner or cephalic arm is chitinized, and with strong teeth which approach the caudal margin of the 9th tergite. Penis with the central vesicle large, its convex side directed dorsad, the penis proper, long and slender.

Female.—Almost as in the ♂, the antennæ shorter; ovipositor with the tergal valves much more slender than the high sternal valves.

Holotype, ♂, Tokyo, Japan; April 26, 1912 (Vial 25).

Allotype, ♀, Tokyo, Japan; April 26, 1912 (Vial 25).

Paratype, ♀; Tokyo, Japan; April 26, 1912 (Vial 25).

Tipula serricauda, sp. n.

Head with a brown median stripe; thorax with three brown stripes; abdomen trivittate with brown; female ovipositor with the

sternal valves exceedingly short, tergal valves long, serrated on the outer margin; wings clouded brown, gray and hyaline.

Female.—Length about 23 mm.; wing 18-18.8 mm.

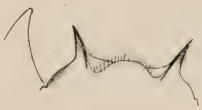
Female.—Palpi with the base dark, the apical segments pale; frontal prolongation of the head rather short, dark above, pale beneath; antennæ, four basal segments light yellow, the remaining segments a little brown at the base, yellow apically; front, vertex and occiput dull yellow, the head with an elongate brown median stripe.

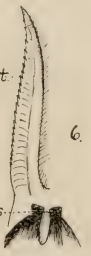
Mesonotal præscutum light brown, with three broad dark brown stripes of which the median one is very broad and is bisected by a pale line, lateral stripes close to the median one; scutum dull brownish yellow, the lobes mostly dark brown; scutellum brownish yellow; postnotum light brown, with three dark brown longitudinal stripes. Pleura brown, much darker on the mesosterna. Halteres rather short, dull yellow, the knob a little brown. Legs, coxæ with the externo-cephalic face brown; trochanters dull yellow, femora and tibiæ yellow, the tips brown; tarsal segment 1 brownish yellow, brown at the tip; segments 2-5 brown. Wings gray, cells C and Sc yellowish brown; dark brown blotches as follows; At base of vein M, in middle of cell M_1 adjoining vein Cu, at origin of Rs, stigmal region including the cephalic portion of the cord. Hyaline blotches scattered over the wing, the largest beyond the stigma, extending obliquely across the wing to cell 1st M_2; a large blotch in cells R and M near the basal third, another in cell M near the tip; others before the stigma and in the anal cells. Venation (see plate XVI, fig. 4).

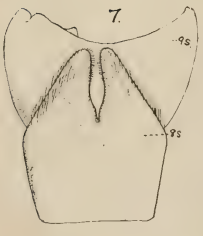
Abdominal tergites brownish yellow, with three indistinct dark brown longitudinal stripes which extend the length of the abdomen. Ovipositor of a remarkable structure; viewed from beneath (see plate XIX, fig. 6), the sternal valves are remarkably short, not even attaining the base of the upper valves; upper valves parallel on a horizontal plane, slightly curved, the inner margin smooth, the outer margin with numerous saw-like teeth. Sternites dull yellow, a broad brown longitudinal median stripe rather indistinct on segments 1–3 but becoming darker and better defined on the apical segments.

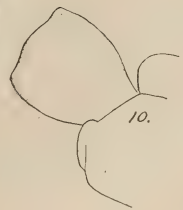
Holotype, ♀, Tokyo, Japan; August, 1912; vial 41.

Paratype, ♀, Tokyo, Japan; August, 1912; vial 41.









JAPANESE CRANE-FLIES.

Tipula yusou, sp. n.

Head and thorax blackish; postnotum blackish; abdomen yellow with three dorsal brown longitudinal lines and one median stripe; wings pale greyish brown variegated with hyaline.

Male: length 15 mm.; wing 19.2 mm.; antennæ 4-5 mm.

Female: length 23 mm.; wing 21 mm.

Male: Palpi and frontal prolongation of the head dark brown, the latter very long; antennæ, segment 1 very long; scapal segments yellow, segment 3 yellow basally darkening into brown at the tip, remaining segments dark brown, the enlarged base even darker, front, vertex and occiput dark brown.

Pronotum dull yellowish brown. Mesonotal præscutum light brown with three darker brown stripes of which the median one is elongate cuneiform, its narrowed point ending just before the suture; scutal lobes dark brown; scutellum dull yellow with an indistinct, narrow darker line; postnotum dark brown. Pleura dark brown. Halteres pale, the stem browner before the knob. Legs, coxæ brown on the outer face, the tips yellow; trochanters yellow; femora yellow, becoming brown at the tip; tibiæ and tarsi brown. Wings, basal half pale yellowish, apical half more brown, cells C and Sc yellowish; stigmal blotch darker brown, irregular; hyaline blotches as follows: a large blotch across the wing before the cord; a narrower one beyond the cord; a large blotch in the caudal portions of cells 1st A and 2nd A; cell M pale in the middle. Venation, see plate XVI, figure 1.

Abdominal tergites 1–7 dull yellow with a narrow dark brown median stripe; segments 3–7 with a shorter and narrower stripe near the lateral margin of each sclerite; segments 8–9 dark brown; sternites dull yellow, also with a distinct, narrow median vitta. Male hypopygium (Lateral aspect, see plate XIX, figure 1): 9th tergite from above, with the caudal margin deeply and broadly rounded, the edge with abundant chitinized teeth, the lateral angles notched; 8th sternite, viewed from the side triangular, the caudal end with a dense bunch of orange coloured hairs; 9th sternite rather large, oval, bearing on its pleural region a group of appendages as follows: the more dorsal a large, fleshy, sigmoid lobe, very densely clothed with long delicate hairs, ventrad and entad of this a large bifid appendage whose caudal branch ends in

a cylindrical chitinized arm, and whose cephalic branch is produced dorsad into a spoon-shaped appendage whose concavity is directed toward the chitinized portion of the 9th tergite; entad of these appendages is a large lobe whose point is chitinized and directed cephalad, the sides with deep parallel grooves. The penis is rather short and very stout; just underneath its tip inside the pleura are a pair of apophyses (shown in the figure), these strongly chitinized and ending in two sharp spines of which the caudal one is the larger.

Female.—Like the ♂, but the dorsal abdominal stripe is much broader, lateral stripes also much broader; on the caudal half of the 7th tergite and on the 8th tergite, all three of the dorsal vittæ unite and cover the segment; the sternal vitta is very broad, but is interrupted at the end of the 6th segment; segments 7 and 8 with a small brown median spot near the caudal margin, and the anterior and posterior edges of the sclerite a little darker; genital segment dull yellow.

Holotype, ♂, Tokyo, Japan; May 7, 1912; vial 36.

Allotype, ♀, Tokyo, Japan; April 26, 1912; vial 21.

Paratypes, 2 ♀, Tokyo, Japan; April 23, 1912; vial 3.

The specific name is that of an aboriginal Japanese race formerly occupying the north-west shores of the southern half of Nippon facing the Sea of Japan.

Explanation of Plates.

Plate XI.

Fig. 1. Wing of *Pachyrhina pullata*, sp. n.
Fig. 2. " *P. palloris* Coquillett.
Fig. 3. " *P. repanda*, sp. n.
Fig. 4. " *P. virgata* Coquillett
Fig. 5. " *P. flavonota*, sp. n.
Fig. 6. Dorsal aspect, 9th tergite, of *P. flavonota*, sp. n.; ♂.
Fig. 7. " " " *P. pullata*, sp. n.; ♂.
Fig. 8. " " " *P. repanda*, sp. n.; ♂
Fig. 9. " " " *P. virgata* Coquillett; ♂.
Fig. 10. Sixth antennal segment, *P. virgata* Coquillett; ♂.
Fig. 11. " " " *P. repanda*, sp. n.; ♂.
Fig. 12. " " " *P. pullata*, sp. n.; ♂.

Fig. 13. Pleural appendages, ♂ hypopyguim, *P. virgata* Coquillett.

Fig. 14. Pleural appendages, ♂ hypopygium, *P. pullata*, sp. n.

Fig. 15. " " " " *P. flavonota*, sp. n.

Fig. 16. " " " " *P. repanda*, sp. n.

Plate XVI.

Fig. 1. Wing of *Tipula yusou*, sp. n.

Fig. 2. " *T. nipponensis*, sp. n.

Fig. 3. " *T. aino*, sp. n.

Fig. 4. " *T. serricauda*, sp. n.

Fig. 5. " *T. yamata*, sp. n.

Fig. 6. " *T. insulicola*, sp. n.

Fig. 7. " *T. coquilletti* Enderlein.

Fig. 8. " *Dictenidia fasciata* Coquillett

Plate XIX.

Fig. 1. Hypopygium of *Tipula yusou*, sp. n.
Lateral aspect; t = 9th tergite; pl = pleura.

Fig. 2. Hypopygium of *T. nipponensis*, sp. n.
Lateral aspect; t = 9th tergite.

Fig. 3. Hypopygium of *T. yamata*, sp. n.
Lateral aspect; t = 9th tergite.

Fig. 4. Hypopygium of *T. aino*, sp. n.
Dorsal aspect of the 9th tergite.

Fig. 5. Hypopygium of *T. aino*, sp. n.
Pleural appendages, lateral aspect.

Fig. 6. Ovipositor of *T. serricauda*, sp. n.
Ventral aspect; t = tergal valve; 5 = sternal valve.

Fig. 7. Hypopygium of *T. coquilletti* End.
Ventral aspect; 8s = 8th sternite; 9s = 9th sternite.

Fig. 8. Hypopygium of *T coquilletti* End.; 9th tergite from above.

Fig. 9. Hypopygium of *T. coquilletti* End.; pleural appendage from the inside.

Fig. 10. Hypopygium of *T. coquilletti* End.; pleura and its appendage from the outside.

A REVIEW OF THE WORK ON THE POISONED BAIT SPRAY, DRY METHOD AND MIXED TREATMENT OF CONTROLLING FRUIT FLIES (TRYPETIDÆ).

BY HENRY H. P. SEVERIN, PH. D., MILWAUKEE, WIS.

As the work on the poisoned bait spray for controlling fruit flies is in its infancy in the United States and beyond the experimental stage in other countries, we have decided to review some of this work in order to set forth some of the methods employed and results obtained. In this paper we shall take up the work of the South African, French, Mexican, United States and Canadian entomologists, and leave the results obtained by the Italian entomologists for a future paper.

It is a well-known fact that fruit flies, after they issue from the pupæ, require 10 days or more before the egg-laying period begins. This interval is a feeding period, and the flies subsist on the nectar of flowers, waxy coating of fruit, juices of injured or cracked fruit hanging on the trees, windfalls, fallen infested fruit and droplets of water. Many fruit-flies show a great fondness for sweets, and one can readily understand why poisoned sweets are so effective in their control. If this poisoned bait is available with the first appearance of the flies on the wing, no doubt large numbers would be killed before the egg-laying period commences.

Mediterranean Fruit Fly (*Ceratitis capitata* Wied.).

Mally (11) of South Africa, apparently unaware of the work of the Italian entomologists started in 1903, began in the season of 1904-5 to spray with poisoned molasses to control the Mediterranean fruit fly, but his experiments were nullified by the scarcity of the flies. Mally's successor, Dewar (4), continued these experiments during the seasons of 1905-7. His results were not conclusive, but they were most encouraging. It was not until the season of 1908-9 that Mally (14) gave a decisive demonstration of the success of the poisoned molasses to combat the Mediterranean fruit fly under South African conditions. "A severe outbreak of the pest in a commercial peach orchard was brought to a sudden and practically complete halt, and the fruit maturing later was marketed under the guarantee of freedom from maggots," while the infestation of the fruit on the control trees increased until practicaliy every fruit was involved.

Fuller (5) in 1909-10, tested the poisoned bait spray to control the Mediterranean fruit fly, and all trials which were made in several citrus orchards to control this pest were "attended with remarkable effects."

In 1912, Lounsbury (9) demonstrated the applicability of the poisoned bait spray to town conditions. His work was carried on under the most unfavourable weather conditions, for rain fell on 23 of the 33 days of experimentation. The garden in which the experiment was performed contained 15 varieties of fruit, and, the author states, "there is probably no other garden in Pretoria where the fly finds conditions more favourable for its welfare." The windfalls from three untreated trees showed respectively: 95¼, 95¾ and 98¼% of maggoty fruit, against an average of 29% from the treated trees, although the distance between the baited and unbaited ones was only about 150 yards. The fruit picked from sprayed trees showed that 13% was infested, whereas practically every ripe fruit was maggoty on the untreated trees. The author concludes, therefore, that if the spraying is properly carried out the remedy is applicable under town conditions even where the summer rainfall is heavy.

The following formulas were used by these South African entomologists:

TABLE I.

	1904-5	1905-7			1908-9		191
Molasses (gall.)	5	7	18	Brown sugar (lb.)	3	2½	6
Arsenate of lead (lb.)	1	1	1	Paste arsenate of lead (oz.)	4	3	6
Water (gall.)	25	25	25	Water (gall.)	5	4	8

The lead arsenate and molasses or brown sugar in all of these formulas were simply dissolved in the required amount of cold water. According to Mally (13), the solution must be kept thoroughly agitated, so that the bait will remain of uniform strength. The spray should be applied so that the minute droplets fall over and through the trees. A pint to a pint-and-a-half is sufficient for a good-sized ten-year-old peach or nectarine tree. Rain will dissolve and wash off the sweet ingredient, and the bait should be renewed as soon as the weather permits. The number of applications of the spray will vary according to local conditions and the season. The first application should be made a month before the presence of the maggots in the fruit is ordinarily expected, and after that an application after the expiration of every

10-14 days is thought advisable. Experience alone will enable us to determine the minimum number of applications necessary to insure good results.

In the Hawaiian Islands we also obtained good results with the use of the poisoned bait spray to control the Mediterranean fruit fly, even though our experiments were conducted under the most unfavourable weather conditions. In our work, Mally's last formula (Table I, 1909), was adopted, but with this difference: Mally used 3 ounces of lead arsenate, and we increased the amount to 5 ounces. To check up the effectiveness of the fruit fly remedy in our work 10 kerosene traps were wired in fruit trees located in different parts of a non-isolated orchard containing about 400 trees. The total number of fruit flies captured in these traps in five weeks was 10,239; of this number 10,203 were males and only 36 were females. With the kerosene traps kept in the same trees, the 400 fruit trees were sprayed about once a week during the following five weeks. The total number of fruit flies captured in the oil traps in five weeks during and after spraying was 182, of which 93 were caught during the first six days. After five applications of the bait, it required a thorough search to find an infested fruit in the orchard, whereas before spraying almost every ripe fruit had been "stung" by the pest.

Melon Fly or Bitter Gourd Fruit Fly (*Dacus cucurbitæ* Coq.).

Marsh (15) tested the poisoned bait spray to control the melon fly in the Hawaiian Islands. His baits were prepared by sweetening water with molasses and adding arsenate of lead or Paris green to the solution. The following proportions of the ingredients were used:

Molasses	1 qt.
Paris green	¼ oz.
Water	1½ gall.

In the experiment with Paris green the applications were made daily, from September 9 until October 14. "Neither the experiment with arsenate of lead or with Paris green proved effective. The flies were frequently observed feeding on the poisoned liquids, but evidently did not relish them, and so failed to consume a fatal dose."

Fuller (5) stationed in Natal, South Africa, used the poisoned bait spray to control the melon fly. He writes: "Where the treat-

ment has been applied for the melon fly which attacks squashes, marrows, pumpkins and the like, it has proved successful."

We also attempted to control the melon fly with the poisoned bait spray in the Hawaiian Islands. The same formula of the bait which we used to control the Mediterranean fruit fly was adopted to combat the melon fly, except that 1 ounce of a soluble poison, such as potassium arsenate or sodium arsenite, was added to the solution. As the melon fly feeds during the early morning hours the insecticide was applied shortly after sunrise to all of the foliage within a pumpkin patch, and also to the vegetation bordering the same. The results obtained after spraying were rather striking. Before spraying thousands of melon flies could be found resting on the lower surface of the leaves, but several days after spraying only here and there could a specimen be found. In all probability these living flies had recently emerged from puparia, or came in from the feeding grounds or from surrounding cucurbit fields.

A few days after the application of the first spray all of the infested pumpkin vines were pulled out of the ground and raked together in piles. The infested pumpkins were scattered within these piles and then all was burned.

To determine whether the melon flies coming from their feeding grounds or from surrounding fields of cucurbits could be controlled, watermelon seeds were planted in a field adjacent to the former pumpkin patch. The seeds sprouted before we were able to make a vigorous campaign in surrounding cucurbit fields. The watermelon plants were sprayed, but the frequent rains washed off the thin film of sugar and left the plants subject to the attacks of the pests coming from outside sources. As soon as the weather became settled a fresh application of the bait was made to the watermelon plants and surrounding vegetation, but the tender stems of some of the watermelon plants were already infested. Whether the pest, which has been allowed to increase unmolested during the past sixteen years, can be controlled under Hawaiian conditions, when one individual sprays and his neighbours do not, is problematical. In all probability better results could be obtained with the poisoned bait spray in a well-isolated cucurbit field away from the valleys, where rains are less frequent during the summer months.

(To be continued).

NOTES ON THE WINTER AND EARLY SPRING COLEOPTERA OF FLORIDA WITH DESCRIPTIONS OF NEW SPECIES.

BY W. S. BLATCHLEY, INDIANAPOLIS, IND.

(Continued from page 144.)

8196.—**Rhinomacer pilosus** Lec. Originally described from Lake Superior, Virginia and California, this weevil has since been recorded from as far south as Agricultural College, Mississippi. A single specimen was beaten from pine at Dunedin, January 29. In his characterization of the family *Rhinomaceridæ* LeConte states that the first joint of the antennæ is "a little stouter than the second but not longer." In the Dunedin specimen it is at least one-half longer.

8205.—**Eugnamptus striatus** Lec. A dozen or more were beaten from oak at Dunedin and Ormond. March 19—April 14.

8223.—**Pterocolus ovatus** Fab. This pretty little weevil was also beaten from oak at Dunedin, Eustis, Sanford and Ormond. March 19—April 14, ten specimens having been secured.

8310.—**Pachnæus distans** Horn. Four examples, taken at Ormond on April 11—14, range from 10 to 14 mm. in length. Horn, in his original description, gives the length as 8 mm.

8340.—**Eudiagogus pulcher** Fab. At Sanford, on January 13, several hundred of this handsome weevil were found hibernating beneath the bark of a pine log which lay by the side of a ditch of running water along the edge of a truck patch. It appears to be a common species throughout the State.

10,814.—**Apion lividum** Smith. Quite common on the dead vines of the wild cucumber (*Melothria*) and in dense masses of Spanish moss at Pelican Bay, Lake Okeechobee. A small reddish-yellow species which at first sight is liable to be taken for an *Anthonomus*.

10,829.—**Hyperodes (Macrops) hornii** Dietz. Beneath boards, along the margins of a shallow fresh-water lake just back of Dunedin, this species and *H. anthracinus* Dietz, were taken in numbers. With them were also several other species of *Listronotus* and *Hyperodes* as yet unidentified. *H. hornii* was also found at Ormond and Lake Istokpoga. January 21—April 14.

Lixus lupinus sp. nov.

Elongate, cylindrical, robust. Black, shining, evenly and rather thickly clothed with a fine, prostrate, gray pubescence which, on the sides of thorax and elytra, is condensed into a broad, prominent marginal stripe. Beak short (2.3 mm. from eye to tip), stout, cylindrical, coarsely, closely and deeply punctate and with a fine but distinct carina reaching three-fourths to tip. Antennæ inserted one-third from tip, the second and third joints of funiculus subequal, the two together slightly longer than the first. Thorax as long as wide, sides parallel from base to middle, thence gradually converging to apex, the latter feebly bisinuate; disc with numerous very coarse shallow punctures, somewhat irregularly placed, their intervals finely reticulate-punctate, without median impressed line but with a broad shallow depression in front of scutellum and a fine carina on apical third. Elytra three times longer than thorax and one-fourth wider at base, sides parallel for three-fourths their length, thence feebly diverging into a rounded apex; disc with a large shallow concavity behind the scutellum and with regular unimpressed rows of rather large distant punctures, their intervals finely granulate-punctate. Abdomen densely pubescent, finely and densely punctate, with numerous scattered very coarse punctures. Length 11—13 mm.; width 3.5—4 mm.

Seven specimens beaten singly from the flowers of the hoary lupine (*Lupinus diffusus* Nutt.) near Dunedin between January 24 and March 18. Resembles *placidus* Lec. but that species has the first and second joints of funiculus equal and the thorax channeled for two-thirds its length. In fresh specimens of *lupinus* the pubescence of beak, thorax and elytra is so dense as to almost conceal the surface sculpture. I had at first thought this a *Cleonus* but as I am unable from the literature to clearly distinguish the differences between *Cleonus* and *Lixus* I sent it to Washington. Mr. Schwarz pronounced it a *Lixus* and wrote: "No one has hitherto been able to point out any generic differences between *Lixus* and *Cleonus* but they differ in habitus and mode of life."

10,845.—**Lixus amplexus** Casey. Quite frequent near Sarasota on the flowers of the large thistle *Carduus horridulus* Pursh. Feb. 13—27.

Lixus leptosomus sp. nov.

Elongate, cylindrical, very slender. Black, shining, very sparsely clothed with fine gray pubescence except along the sides of the thorax and elytra, where it forms a narrow but conspicuous stripe; antennæ and tarsi reddish brown. Beak short, stout, cylindrical, densely and finely reticulate-punctate, feebly carinate. Antennæ inserted at middle of beak, the first joint of funiculus stouter but subequal in length to second which is one-half longer than third. Thorax cylindrical, one-fourth longer than wide, base and apex truncate, disc without smooth median line or basal impression, coarsely and sparsely punctate, the intervals with very fine sparse punctures. Elytra at base not wider than thorax, two and one-third times as long, sides parallel for four-fifths their length, thence gradually converging to a subacute apex; disc with rows of small distant punctures, the intervals very finely and sparsely punctate. Abdomen densely pubescent, finely and sparsely punctate. Length 7 mm.; width 2 mm.

One specimen swept from low herbage along the border of a cypress swamp. Sanford, April 9. The only other described species to which it appears to be closely allied is *L. tenellus* Casey, from which it differs in the relative length of antennal joints, in the beak being densely instead of "extremely sparsely" punctate and in the relatively longer thorax and greater length of body.

11,029.—**Neomastix punctulatus** Dietz. Quite frequent on the flowers of the Ericad, *Andromeda nitida* Bart., at Dunedin, Sanford and Ormond. January 19—April 15.

8684.—**Prionomerus calceatus** Say. One example of this common northern weevil was taken at Lake Istokpoga February 29. I do not find it mentioned in any Florida list.

8719.—**Conotrachelus aratus** Germ. Two specimens were beaten from oak, one at Dunedin, March 28; the other at Sanford, April 4.

8724.—**Conotrachelus belfragei** Lec. Of this, the most handsome of the genus, a single example was beaten from pine at Eustis, April 6th. It was described from one specimen taken in Texas by Belfrage.

8774.—**Acalles ventrosus** Lec. Quite common beneath boards along the margin of fresh-water lakes near Dunedin and Kissimmee. January 18—March 19.

Tyloderma punctata Casey. Very common with the preceding; also at Sarasota and Ormond. Mating in February and March. Very distinct from *T. æreum* Say with which it is usually confounded. A single specimen of the latter was taken at Lake Okeechobee.

8797.—**Cryptorhyncus apiculatus** Gyll. A single example of this rare species was taken at Dunedin January 20; also from the border of a lake.

8821.—**Tachygonus lecontei** Gyll. One of these curious little weevils was beaten from oak at Ormond. April 15.

8826.—**Craponius inæqualis** Say. Quite frequent at Dunedin, Eustis and Ormond. January 23—April 13. Beaten from the wax-myrtle or bayberry

11,110.—**Baris æneomicans** Casey. Frequent at Dunedin; also taken on Sanibel Island and at Kissimmee. Occurs in low moist meadows.

8907.—**Madarellus undulatus** Say. One specimen from Utopia, east shore of Lake Okeechobee. The thorax is much more coarsely punctate than in those from Indiana.

8978.—**Rhodobæus tredecimpunctatus quinquepunctatus** Say. One taken by sweeping at Sanford. April 9. Schwarz records it as occurring on thistle flowers. The elytra are wholly black except a narrow reddish stripe along each side margin. The central spot of thorax is large, fusiform, reaches almost to apex, and in the Sanford specimen unites at base with the two hinder lateral spots which are obliquely merged along the base. It is a distinct southern colour variety, which in my opinion should be kept in the lists.

8983.—**Sphenophorus inæqualis** Say. Single specimens were taken at St. Petersburgh and Eustis beneath cover in low damp soil. January 20—April 7.

9002.—**Sphenophorus retusus** Gyll. One at Dunedin. January 16.

11,215.—**Sphenophorus minimus** Hart. One at Dunedin,

February 7. This is quite frequent in low sandy localities in Indiana.

9019.—**Gononotus lutosus** Lec. Eight specimens were found beneath drift along the beach of Clearwater Bay at Dunedin. January 21—February 8.

A NATIONAL COLLECTION OF CANADIAN INSECTS.

The Secretary of State, with the concurrence of the Minister of Agriculture, has appointed the Dominion Entomologist, Dr. C. Gordon Hewitt, Honorary Curator of Entomology in the Canadian National Museum, Ottawa.

For a number of years the Entomological Branch of the Department of Agriculture has been laying the foundation of a representative collection of the insects of Canada. This collection, together with several collections which have been acquired by the Museum, constitute the basis of a National Collection. In it will be incorporated the insects collected and received by the Entomological Branch and by the Museum. As the National Museum is under the direction of the Director of the Geological Survey and Deputy Minister of Mines, increased facilities will be afforded for securing entomological collections made by surveying and exploring parties, for example, the Canadian (Stefansson) Arctic Expedition is collecting insects for the National Collection. The collections will be stored in cabinets similar to those now in use in the United States National Museum at Washington, and it will be a great satisfaction to Canadian entomologists to know that the collections will be housed in a fire-proof building. It is hoped that this important move in the interests of Canadian entomology will receive the support of collectors throughout the country. Collectors having duplicate material will greatly assist in building up the collections by sending such extra specimens of local insects as they may be able to spare for inclusion in the National Collection. Especially is it to be desired that types of Canadian species shall be deposited in the National Museum, where they will be properly cared for.

The Entomological Branch of the Department of Agriculture will continue its practice of naming insects for collectors, and such collections and correspondence relating to the same should be addressed to "The Dominion Entomologist, Ottawa."

AMERICAN TRICHOPTERA—NOTES AND DESCRIPTIONS.

BY NATHAN BANKS, EAST FALLS CHURCH, VA.

(Continued from p. 205.)

Hydropsyche partita, n. sp. (Figs. 58-59.)

Black; head and thorax with grayish white hair; palpi nearly black; antennæ yellow, with spiral black line; abdomen black above, pale beneath; legs pale yellow, anterior femora rather darker. Wings brown, densely irrorate with whitish, nearly all over, the apical part very plainly so, a longer pale mark on hind margin before arculus; hind wings gray, darker on costal tip. Fork 1 longer than pedicel, fork 2 extends a little way on discal cell, fork 3 with short pedicel, median cross-vein its length out on median cell; in hind wing fork 1 is very short, fork 2 a long distance on discal cell; male with eyes wide apart, not enlarged.

Expanse 23 mm.

From Switzer's Camp, San Gabriel Mts., June, Mt. Wilson, 10 Aug., and Pasadena, May, all California (Grinell); Pecos, New Mexico, July, Aug., and Vineyard, Utah, July (Spalding).

Hydropsyche venularis, n. sp. (Fig. 62.)

Black; head and thorax with whitish hair; palpi very dark; antennæ yellow, annulate with brown; legs pale yellow. Wings pale, the cubitus heavily bordered with dark brown or black, anal also bordered, a large, elongate streak near stigma, sometimes broken by pale spots, a black spot at end of first apical vein, apical part of wing often infuscate, elsewhere dark spots, often along veins, and some patches of gray hair, all marks tend to be longitudinal; hind wings gray, tip darker. Eyes of male large, approximate. Venation as in *H. scalaris.* Male superior plate with minute emargination, the second part of lower appendage very short and broad, with bifid tip.

Expanse 22 mm.

From Washington, D. C.; Great Falls, Va.; Dane Co., Wisc.; St. Louis, Mo., June to Sept. I had thought this might be *H. reciproca* (*indecisa*), but that species is near *H. scalaris.*

Hydropsyche slossonæ, var. **recurvata,** n. var. (Fig. 73).

Very similar to *slossonæ* in appearance and structure, the genitalia of male on same plan, the penis having practically the same structure, but the superior plate has only very short processes, instead of the long ones of true *slossonæ*.

From Go Home Bay, Georgian Bay, Ont. (Walker).

Diplectrona californica, n. sp. (Fig. 63).

Head black, with some yellowish hair; palpi brown; antennæ brown, annulate with pale, strongly crenate beneath; legs pale yellowish. Wings brown; quite broad; stigmal area swollen below in both wings, fork 1 but little longer than pedicel, fork 3 longer than pedicel, fork 4 reaching far back, before thyridial cross-vein; in hind wings fork 1 almost reaches to the discal cell, fork 3 hardly longer than 1, in both wings discal cell is over three times as long as broad.

Expanse 10 mm.

From Claremont, Calif. (Baker).

Psychomyia diversa, n. sp. (Fig. 64).

Black; palpi brown; antennæ dark, faintly annulate with pale, black hair on face, brown on warts and some yellowish on front of vertex, thorax with black hair; wings black, especially dark along the costa; no marks, some yellowish hair scattered through the black; femora pale yellowish, in the male, tibia and tarsi dark or nearly black, in the female, pale, and in the female the wings are generally less dark than in the male; male genitalia pale, the upper lateral pieces are longer and not as broad as in *P. canadensis;* in fore wings the tip of the discal cell is oblique and the fork 2 reaches one-half way back on the cell, fork 3 begins beyond fork 4.

Expanse 10 mm.

From Black Mt., north fork of the Swannanoa River, N. Car., May.

Philopotamus.

Fork 1 very short; hind tibiæ not more hairy than rest of legs; tip of female abdomen does not form a long ovipositor. The genitalia of our two species (*distinctus* and *americanus*) are figured.

Dolophilus.

Fork 1 reaches to discal cell; hind tibiæ of male very hairy; in female the tip of abdomen forms a long ovipositor; in our species the discal cell is not angulate above.

I have two species of this genus as defined above; the characters used to distinguish the European species from *Philopotamus* do not apply to our forms.

Dolophilus major, n. sp. (Fig. 66).

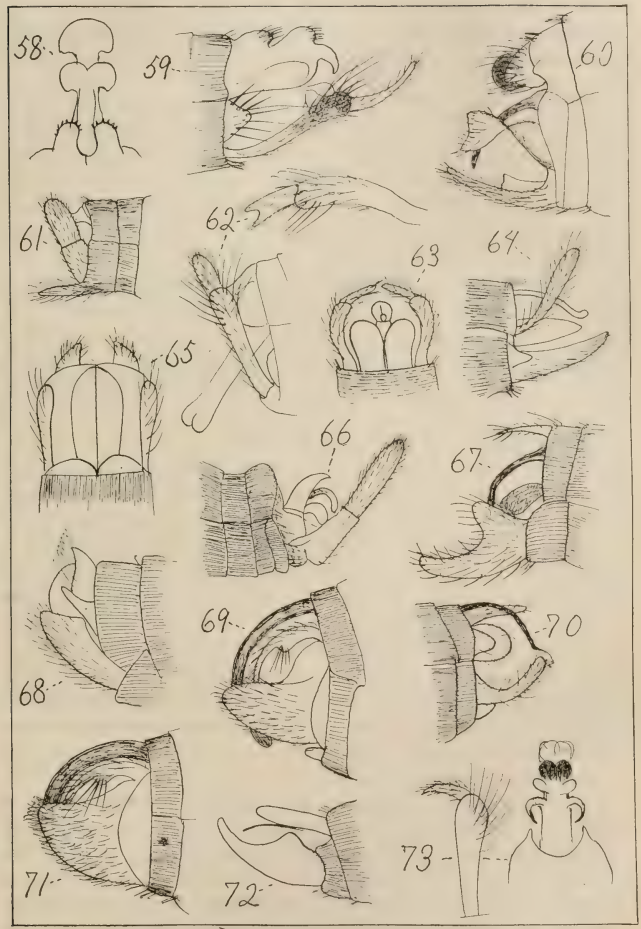
Black, with black and golden-yellow hair; golden hair on front of vertex and base of thorax; palpi brown, antennæ dark, annulate with black, coxa and femora rather dark, rest of legs paler; abdomen black; wings black; fore wing beautifully spotted with golden hair, spots rather small, and mostly subequal in size and situate in the cells, each apical cell with four to ten of them, all over wings; hind wings blackish. Wings long, fork 1 reaches to the discal cell, fork 2 is its width on discal cell, fork 4 a little before fork 3, both long, discal cell nearly three times as long as broad; hind wings with forks 1 and 2 very narrow, as long as in the fore wings.

Expanse 22 mm.

From Black Mt., north fork of the Swannanoa River, N. Car., May. I have no female, and its large size seems out of place in this genus, but the genitalia and long fork 1 will not fit in *Philopotamus*.

Dolophilus breviatus, n. sp. (Fig. 61).

Face dark; antennæ brown, annulate with yellowish; palpi brown; gray hair between antennæ, and on vertex and thorax, a tuft of black hair near each eye; abdomen brownish; legs yellowish, brownish on tarsi; hind tibiæ with much long pale hair. Wings dark, densely irrorate with golden, a large golden spot before and one beyond stigma, costal area interrupted once with golden; the golden on wing is so dense a reticulation that the dark appears to be broken into many little rectangles; hind wings gray, blackish at tip. Fork 1 reaches to discal cell in both wings, in fore wings forks 3 and 4 subequal, in hind wing fork 3 is much longer than pedicel; the third joint of maxillary palpi much longer than fourth; in female there is a long yellowish ovipositor.



NEW AMERICAN TRICHOPTERA.

Expanse 12 mm.

From Coy Glen, Ithaca, N. Y., July, and Black Mt., north fork Swannanoa River, N. Car., May.

Plectrocnemia canadensis Bks. (Fig. 37).

My *Polycentropus canadensis* must be referred to *Plectrocnemia*, unless a new genus is made for these small forms. The female has the mid legs with dilated tibia and tarsi, but fork 1 is present in both wings, and discal cell closed in both wings. In fore wings fork 1 is as long as its pedicel, fork 2 back to discal cell, fork 3 with short pedicel, fork 4 back as far as fork 2. In hind wings fork 1 is about as long as pedicel, fork 2 reaches to cell. The male genitalia are figured. It occurs in many places in Eastern States.

Plectrocnemia cinereus Hagen. (Figs. 25, 26).

This is a larger species than *P. canadensis*, but the male genitalia, which are figured, are similar.

Plectrocnemia adironica n. sp. (Fig. 60).

Palpi brownish; antennæ pale, broadly annulate with brown; vertex with gray hair in middle, black hair on sides; whitish hair on thorax; abdomen black above, yellowish beneath, legs pale yellowish. Wings gray, with blackish marks along costa and cubitus; blackish spots at end of veins, yellowish between them, rest of wing with pale brown areas, mostly with yellowish hair; hind wings pale, darker at tip. In fore wings no fork 1, fork 2 reaches a little way on discal; fork 3 with short pedicel, fork 4 hardly longer, not as far back as fork 2, fork 5 broad near base; in hind wings fork 1 is nearly as long as its pedicel, fork 2 back on cell, fork 5 very broad; the male genitalia have a rather long median ventral plate.

Expanse 20 mm.

From Axton, Adirondack Mts., N.Y., 12-22 June (MacGillivray). The absence of fork 1 in the fore wings makes its generic position rather doubtful; if the loss is accidental, it is a *Plectrocnemia*.

Phylocentropus vestitus Hagen. (Fig. 35).

I cannot see any difference in the male genitalia between the large spring specimens and the small autumn specimens, both of

which occur here. I have one specimen in which fork 2 is stalked in all four wings, a very unusual variation, as fork 2 is normally the most constant of all the forks. I figure the male genitalia.

Neureclipsis signatus Banks. (Fig. 72).

My *Polycentropus signatus* belongs to this genus, I figure the male genitalia.

Holocentropus interruptus n. sp. (Fig. 71).

Brown, with white and gray hair; palpi pale yellowish; face with dark brown hair, white hair on vertex and thorax; antennæ yellowish, annulate with brown; legs pale yellow. Wings brownish, with many spots and dots of whitish hair, the costal area is interrupted three times with white, a white mark over stigma, beyond are white spots between ends of veins, larger spots on basal middle region, elsewhere mostly small, but often connected, fringe black at ends of the veins, hyaline marks not noticeable. Fork 1 is shorter than pedicel, sometimes only one-half as long, fork 3 is twice as long as its pedicel. Lower appendage of male is broader at base than in *H. flavus*. A slender appendage on each side of body like *Diplectrona*.

Expanse 17 mm.

From Hampton, N.H., June (Shaw); Dane Co., Wisc., July (Vorhies); and Squam Lake, N.H., July (Allen).

Holocentropus orotus n. sp. (Fig. 69).

Palpi brown; antennæ yellowish; face blackish, vertex with white hair in middle, black on sides, thorax white haired; abdomen brown, yellowish beneath; legs yellowish, tarsi darker. Wings brown, with some white spots, three in the costal area (one each side of stigma), around the tip are white spots between veins, and a few in middle of wing, but not as numerous as in *H. interruptus*; hind wings gray, with blackish fringe. Fore wings with discal cell about equal to the pedicel, fork 1 very short, fork 3 as long as pedicel, fork 4 reaches only a little before fork 3. Genitalia similar to *H. interruptus*, but the lower appendages are not as broad, and their upper tips are produced inward so that they touch each other.

Expanse 16 mm.

From Clear Creek and Chimney Gulch, Golden, Colo. (Oslar).

Holocentropus longus n. sp. (Figs. 65, 68).

Palpi pale, dark on last joint; face dark, with black bristles above; vertex black with white hair; antennæ yellowish, annulate with brown; thorax with white hair; legs yellowish; wings brown, irregularly spotted with white, four white marks on costal area before stigma, spots between veins on margin, and many elsewhere, often connected; hyaline marks not distinct. The fore wings are longer than usual, fork 5 with sides parallel for most of its length, in type fork 1 is a mere rudiment at margin, but in another specimen (♀) it is longer than pedicel, in this female there is a short fork 1 in one hind wing.

Expanse 20 mm.

From Framingham, Mass., June (Frost), and Digby, Nova Scotia (Russell), June.

Polycentropus centralis n. sp. (Fig. 67).

Palpi yellowish; antennæ pale, annulate with dark; face brown, vertex with yellow hair in middle, black by eyes, thorax with golden hair, abdomen brown above, yellowish below; legs yellow. Wings dark brown, rather densely spotted with patches of yellow hair; anal and cubital veins more heavily black than others; hind wings gray, blackish at tips; fork 1 about as long as pedicel, venation otherwise like *P. confusus*. Size, rather smaller than *P. confusus*, and lower male appendages of different shape.

From St. Louis, Mo., June.

Polycentropus confusus Hagen. (Fig. 70).

This is common in Northern States; the male genitalia are figured.

(To be continued.)

BOOK REVIEWS.

A Textbook of Medical Entomology. By Walter Scott Patton, M.B. (Edin.), I.M.S. and Francis William Cragg, M.D. (Edin.), I.M.S., London, Madras and Calcutta, 1913.

The science of medical entomology, although of very recent origin, has developed so rapidly within the past decade and the

literature is scattered through so many periodicals that it has become a difficult matter, even for the specialist, to keep in touch with all that is being written on the subject.

A comprehensive textbook of medical entomology has therefore been urgently needed and the appearance of the monumental work by Captains Patton and Cragg will be welcomed not only by entomologists but also by medical practitioners in tropical lands and by students of protozoology, with which subject medical entomology is so closely associated.

This voluminous work extends over 764 pages and includes no less than 89 full-page illustrations. Its bulk, however, is not the result of diffuseness, for the diction is clear and concise, but of the vast quantity of information it contains. Considering the wide field it covers it is not too large for a useful work of reference.

Perhaps the most striking feature of the book is the large amount of original matter both in the text and the illustrations, which are uniformly excellent. Much space is devoted to the anatomy and physiology of blood-sucking insects, particularly to the structure and mechanism of the mouth-parts, and to the description of methods of breeding and laboratory technique.

The general features of insect anatomy and physiology are illustrated by reference to the Diptera, particularly the various blood-sucking types, a number of which are described in considerable detail, but none of the orders that contain species of interest from the medical standpoint are neglected, each order forming the subject of a chapter of its own, except the Diptera, which include two chapters, in addition to the one in which the anatomy and physiology are treated.

In each chapter the subject is discussed from every standpoint, the anatomy, taxonomy, relation to disease and bionomics, all receiving adequate attention. Valuable information is also given on methods of collecting, dissecting and preserving and each chapter concludes with a careful bibliography. The analytical keys to the genera and species have been taken from the best sources available.

The last two chapters deal respectively with laboratory technique and a general discussion of the relation of Arthropods to their parasites.

Altogether the authors are to be congratulated on the splendid

fruit of their labors, for the work would have been a credit to any country, and is therefore the more remarkable for having been written entirely in India.

Evolution of the Colour Pattern in the Microlepidopterous Genus Lithocolletis. By Annette Frances Braun. Journ. Acad. Nat. Sci., Phila. (2), XVI, p. 105–168; with 26 text figures and pls. III and IV with 99 coloured figures.

In this work Miss Braun, who is well known to readers of the Canadian Entomologist for her work on the Tineidæ, has made a careful study of the numerous species of the genus Lithocolletis, with the object of determining the primitive colour pattern of the genus and the principles involved in its evolution among the various species. The work is based upon a comparative study of the adults of 95 species as well as the development of the pupal wings in 11 representative forms.

The general conclusions arrived at are as follows: The primitive pattern of the fore wing consists of a series of seven pale yellow transverse bands separated by unpigmented areas, the arrangement of the bands having a definite relation to the course of the longitudinal veins. These primitive bands constitute the ground colour of the wings and tend to become broader during both ontogenetic and phylogenetic development, in some species suffusing the entire wing. Dark markings appear only at the limits between the ground colour and the unpigmented areas, but these markings once firmly established in the species become independent of extension of the ground colour.

It is suggested that "the uniform yellowish ground colour which suffuses the wing in the higher Lepidoptera, beginning at the base and spreading distalward, is the outcome of a phylogenetically older type of marking, originally banded, and later fused to a uniform colour, and that the markings are a second series superimposed upon the first." The occurrence in some of the higher Lepidoptera of dark bands in pairs seems to be an indication of their origin on each side of a primitive band of the ground colour, as in Lithocolletis.

The work is illustrated by many text-figures and two coloured plates on which the figures of 92 species are grouped in the form of a phylogenetic tree.

Mailed July 10th, 1914.

The Canadian Entomologist.

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AMERICAN TRICHOPTERA—NOTES AND DESCRIPTIONS.

BY NATHAN BANKS, EAST FALLS CHURCH, VA.

(Continued from p. 258.)

LEPTOCERIDÆ.

Molanna flavicornis, n. sp. (Fig. 46).

Body black, including thorax above, head and thorax clothed with whitish gray hair, basal joint of antennæ dark, beyond wholly pale yellowish (in both sexes); palpi pale, legs pale yellowish, more or less infuscated on femora. Wings yellowish gray. Venation similar to *M. uniophila*, alike in both sexes, venation pale; in fore-wing the cubitus united to the median at a rather obtuse angle, but separates at a very acute angle, as in other species; in the hind wings fork 2 has diverging sides.

Expanse 27 mm.

From Husavick, Man., July, and Winnipeg, Man., May, (Wallis).

Triænodes dentata, n. sp. (Fig 45).

Yellowish gray, head and basal joint of antennæ densely clothed with long yellowish hair; antennæ pale, joints narrowly dark at tips, legs pale. Wings gray, with much gray and yellowish hair, near outer margin there is much black hair, the outer fringe mostly black, deep black at outer angle, posterior fringe gray, a black spot at the arculus, and another about half way from it to base; hind wings yellowish gray, with gray fringe, venation in both pairs pale; costa of fore wings (in ♂) densely hairy. Venation as in *T. ignita*, but the fork 1 is still shorter.

Expanse 18 mm.

From Johnstown, N. Y., June (Alexander), and Hampton, N. H., July (Shaw).

Leptocella stigmatica, n. sp. (Fig. 48).

Face pale, vertex dark with yellowish or gray hair; basal joint of antennæ brown, rest with pale on basal part of the joints, gradually darker beyond; palpi pale; thorax brown, with short yellowish white hair; the abdomen and legs yellowish. Wings gray, in male a large dark brown spot on the stigmal region back to the radial sector, the anastomosis dark-margined, and veins elsewhere faintly dark-margined, fringe black on outer margin; hind wings gray, with gray fringe, black at upper tip. Fore wings very slender, the apical cells short, fork 1 longer than pedicel, fork 3 reaches nearly to the anastomosis, discal cell longer than second apical, not much swollen above; hind wings very broad, basal venation can be traced in a strong light, similar to that of *L. exquisita.* Lower male appendage with blunt tip.

Expanse 27 mm.

From Jemez Mts., New Mexico, June and July (Woodgate).

Leptocella intervena, n. sp. (Figs. 15, 50).

Pale yellowish, with white hair; antennæ rather broadly annulate with dark brown. Fore wings white, in the apical part there are short dark streaks in the cells not touching the veins, these streaks form incomplete bands across the wing, other dark marks along the anal margin; a few black streaks in the middle of wing, but not so distinct as in apical part of wing.

Expanse 21 mm.

From Zavalla Co., Nueces River, Texas, 26 and 27 April (Hunter and Pratt) at light. Type in National Museum.

Œcetina interjecta, n. sp. (Figs. 2, 5).

Face yellow, vertex dark, palpi and antennæ pale, latter with tips of joints narrowly black; thorax brown; abdomen pale brown, yellowish near tip; legs pale yellow. Wings gray, veins darker, a long dark cloud near the stigma; hind wings gray, with darker gray fringe. Fore wings with costal margin much curved near tip, fork 1 reaching to discal cell, veinlets of anastomosis much disjointed; hind wings with fork 1 very short, fork 3 twice as long, and fork 5 reaching nearly one-half way to base.

Expanse 14 mm.

From Go Home Bay, Georgian Bay, Ont., 23 Aug. (Walker).

Leptocerus angustus, n. sp. (Fig. 40).

Body dark, head with gray hair; palpi black, with gray hair. Basal joint of antennæ yellowish brown, rest dark, extreme bases of joints whitish; legs pale. Wings gray, with many black hairs near tip, a white point each side of dark stigma, and another white spot at arculus, outer fringe interruptedly dark and white, a long black streak on margin beyond arculus; hind wings gray. Fore wings with fork 3 reaching before fork 1, anastomosis with upper vein disjointed from others, which are nearly interstitial, discal cell reaching fully twice its width before thyridial cell.

Expanse 20 mm.

From Go Home Bay, Georgian Bay, Ont., 1 Aug. (Walker).

Leptocerus retactus, n. sp. (Fig. 41).

Gray; face yellowish, with white hair; palpi dark gray; vertex dark brown; abdomen pale yellowish, darker at tip; legs pale, but tibiæ rather gray. Wings gray, with yellowish brown hairs, hyaline dots near base of discal cell, and middle part of costal area hyaline, the median and anal veins for some distance narrowly lined with hyaline. Wings not very long; fore wings with discal cell very long, narrowed near tip, the veins of anastomosis much disjointed and oblique; fork 1 twice as long as pedicel, the double fork (of female) barely longer than fork 1. In hind wings the first and third forks about equal.

Expanse 16 mm.

From Muskoka River, Ont.; 30 June, and Go Home Bay, Ont., 8 Aug. (Walker).

Leptocerus inornatus, n. sp. (Fig. 42).

Yellowish brown, white hair on face; palpi gray; antennæ yellowish, narrowly annulate with brown; mesonotum dark brown; abdomen yellowish, brown at tip; legs yellowish, fore tarsi white, plainly annulate with brown, mid-tarsi less distinctly marked, hind tarsi all pale. Wings brownish, with brown veins, no marks, clothed with fine white and gray hair. In fore wings fork 1 has a pedicel about as long as fork, fork 3 plainly longer than its pedicel, end of discal cell much beyond the median cross-veins.

Expanse 23 mm.

From Victoria, Texas, 23 March (Mitchell). Type in National Museum.

Leptocerus futilis, n. sp. (Figs. 44, 49).

Body black, head with white hair; palpi dark, with white hair, basal joint of antennæ dark, rest whitish with dark tips to joints; thorax with white stripes in front, and tufts over base of wings; legs pale. Wings dark gray, veins dark, surface clothed with very short yellowish hair, a pale spot at arculus; fork 3 extends more basad than fork 1; the three cross-veins of anastomosis widely disjointed; discal cell extends hardly its width before thyridial cell.

Expanse 21 mm.

From Go Home Bay, Ont., 11 July (Walker).

CALAMOCERATIDÆ.

Psiloneura, n. gen.

In both wings forks 1, 2, 3, 5, the discal cell is closed, in fore wings a cross-vein from base of fork 1 (or before) to the radius; discal cell moderately short; spurs 1, 2, 4 all very short; antennæ wide apart at base; maxillary palpi with joint 2 much longer than any others.

Type.—*P. mœsta*, n. sp.

Philoneura mœsta, n. sp. (Fig. 12).

Brown; palpi brown, face with few yellow hairs; antennæ dark brown; vertex with golden and black hair; thorax blackish near base of wings; abdomen black; legs yellowish; wings grayish brown, with very short yellowish hair; face broad, antennæ wide apart, about two-thirds as long as the fore wings, venation as figured, the corneous dot in fork 2 is one-fourth the way from base, instead of near base as in most species. In fore wings fork 1 extends two-thirds of way back on discal cell, the cross-veins before base of fork up to radius.

Expanse 22 mm.

From Cambridge, Mass., Sept.

Astoplectron, n. gen.

Type.—*Heteroplectron boreale* Prov. Similar to *Heteroplectron*, but no fork 4 in fore wings of either sex, and in ♂ no fork 3, and in hind wings the discal cell is closed. In hind wings forks 1, 2,

3, 5. In fore wings fork 1 reaches far back on cell, fork 3 hardly as long as fork 2; there is no cross-vein from radial sector to radius, spurs 2, 4, 4; basal joint of the antennæ about as long as the vertex.

Astoplectron connexa, n. sp. (Figs. 24, 55).

Similar in appearance to *A. boreale* Prov.; body and wings brown, without markings, legs paler; basal joint of antennæ dark. Differs from *A. boreale* in that the vein at upper side of fork 1 is angularly bent up toward radius, and connected to radius by a cross-vein, this just alike in both fore wings; in three males of *A. boreale* there this vein is straight; besides the proportions of the cells are slightly different. The male appendages are a little shorter than in *A. boreale.*

Expanse 18 mm.

From Great Falls, Va., 12 June.

SERICOSTOMATIDÆ.

Olemira costalis, n. sp. (Fig. 34).

Brown; palpi covered with long, dense, black hair; antennæ brown, basal joint black beneath; vertex pale in middle, vertex and thorax with some yellow hair; legs yellowish; wings gray, nearly uniformly coloured, fringes darker. In male the costal area is swollen and reflexed over the wing, just as in *O. americana,* except that this reflexed part is only about one-half as wide as in *O. americana;* venation as in that species, but in the hind wings the discal cell is a little longer; genitalia similar to that of *O. americana.*

Expanse 15 mm.

From Woodworth's Lake, Fulton Co., N. Y., 19 August (Alexander). *O. americana,* besides the type locality, I have seen it from Riverside, Mass., and Falls Church, Va.

Micrasema falcata, n. sp. (Fig. 52).

Brown; palpi yellowish; antennæ dark at base; head and thorax with gray hair; abdomen black, with white hair; legs pale, with white hair. Wings brown, with scattered yellowish and black hairs; venation similar to that of *M. charonis;* discal and median cross-veins interstitial, fork 1 reaching back on discal cell further

than in *M. charonis*, and fork 2 has a very much longer pedicel, longer than the discal cell.

Expanse 10 mm.

From Great Falls, Va., 12 May.

Micrasema charonis, n. sp. (Figs. 3, 47, 51).

Jet black; head and thorax with black hair; legs rather brown; abdomen with rather long, erect hairs above; spurs very short, not as long as width of the joint. Venation as figured; maxillary palpi long, slender, upcurved, reaching to tip of basal joint of antennæ, sparsely hairy.

Expanse 10 mm.

From Black Mts., North Fork Swannanoa River, N. Car., May. The first record of this genus from the United States.

Mormomyia vernalis Bks. (Figs. 1, 4, 28).

I have this species from Tryon, N. Car. Among the original series are two specimens with slightly longer wings, and both have fork 4 well developed in each fore wing; both are males, and their genitalia do not appear to differ from typical specimens.

Schizopelex hesperus, n. sp. (Fig. 10).

♀.—Brown; vertex and thorax with white hair above; antennæ brown; wings brown, densely and evenly clothed with short golden hair, no markings; hind wings gray, with sparse golden hair, abdomen brown; front and mid legs brownish, hind legs yellowish. Venation similar to *S. lobata*, but fork 2 is acute at tip.

Expanse 28 mm.

From Vinyard, Utah, 10 July. Differs from *S. lobata* in the white hair of head and thorax.

Explanation of Plates.

Fig. 1.—*Mormomyia vernalis*, hind wing.
Fig. 2.—*Œcetina interjecta*, fore wing.
Fig. 3.—*Micrasema charonis*, wings.
Fig. 4.—*Mormomyia vernalis*, head.
Fig. 5.—*Œcetina interjecta*, genitalia.
Fig. 6.—*Stenophylax hesperus*, genitalia above.
Fig. 7.—*Anisogamus infernalis*, genitalia.

Fig. 8.—*Limnephilus spinatus*, genitalia.
Fig. 9.—*Limnephilus spinatus*, genitalia above.
Fig. 10.—*Schizopelex hesperus*, wings.
Fig. 11.—*Neuronia smithi*, genitalia.
Fig. 12.—*Psiloneura moesta*, wings, palpi.
Fig. 13.—*Limnephilus argenteus*, genitalia.
Fig. 14.—*Limnephilus æqualis*, genitalia.
Fig. 15.—*Leptocella intervena*, fore wing.
Fig. 16.—*Glossosoma penitus*, genitalia.
Fig. 17.—*Limnephilus secludens*, genitalia.
Fig. 18.—*Paragapetus moestus*, fore wing.
Fig. 19.—*Glossosoma penitus*, genitalia, beneath.
Fig. 20.—*Paragapetus moestus*, genitalia.
Fig. 21.—*Stenophylax hesperus*, genitalia.
Fig. 22.—*Anisogamus disjunctus*, genitalia.
Fig. 23.—*Paragapetus moestus*, hind wing.
Fig. 24.—*Astoplectron connexa*, wings.
Fig. 25.—*Plectrocnemia cinerea*, genitalia, above.
Fig. 26.—*Plectrocnemia cinerea*, genitalia.
Fig. 27.—*Limnephilus secludens*, genitalia, behind.
Fig. 28.—*Mormomyia vernalis*, genitalia.
Fig. 29.—*Limnephilus productus*, genitalia, above.
Fig. 30.—*Philopotamus distinctus*, genitalia.
Fig. 31.—*Limnephilus æqualis*, genitalia, above.
Fig. 32.—*Stenophylax flavata*, genitalia, above.
Fig. 33.—*Stenophylax flavata*, genitalia, behind.
Fig. 34.—*Olemira costalis*, genitalia.
Fig. 35.—*Phylocentropus vestitus*, genitalia.
Fig. 36.—*Limnephilus productus*, genitalia.
Fig. 37.—*Plectrocnemia canadensis*, genitalia.
Fig. 38.—*Philopotamus americanus*, genitalia.
Fig. 39.—*Rhyacophila acropedes*, genitalia.
Fig. 40.—*Leptocerus angustus*, genitalia.
Fig. 41.—*Leptocerus retactus*, genitalia.
Fig. 42.—*Leptocerus inornatus*, genitalia.
Fig. 43.—*Rhyacophila bipartita*, ♀ plate below.
Fig. 44.—*Leptocerus futilis*, genitalia.

Fig. 45.—*Triænodes dentata*, genitalia.
Fig. 46.—*Molanna flavicornis*, genitalia.
Fig. 47.—*Micrasema charonis*, head.
Fig. 48.—*Leptocella stigmatica*, genitalia.
Fig. 49.—*Leptocerus futilis*, genitalia, above.
Fig. 50.—*Leptocella intervena*, genitalia.
Fig. 51.—*Micrasema charonis*, genitalia.
Fig. 52.—*Micrasema falcata*, genitalia.
Fig. 53.—*Rhyacophila bifila*, genitalia, ♀.
Fig. 54.—*Rhyacophila bipartita*, genitalia.
Fig. 55.—*Astoplectron connexa*, genitalia, palpus.
Fig. 56.—*Rhyacophila bifila*, ♀, beneath.
Fig. 57.—*Agapetus malleatus*, genitalia.
Fig. 58.—*Hydropsyche partita*, penis.
Fig. 59.—*Hydropsyche partita*, genitalia.
Fig. 60.—*Plectrocnemia adirondica*, genitalia.
Fig. 61.—*Dolophilus breviatus*, genitalia.
Fig. 62.—*Hydropsyche venularis*, genitalia.
Fig. 63.—*Diplectrona californica*, genitalia.
Fig. 64.—*Psychomyia diversa*, genitalia.
Fig. 65.—*Holocentropus longus*, genitalia, above.
Fig. 66.—*Dolophilus major*, genitalia.
Fig. 67.—*Polycentropus centralis*, genitalia.
Fig. 68.—*Holocentropus longus*, genitalia.
Fig. 69.—*Holocentropus orotus*, genitalia.
Fig. 70.—*Polycentropus confusus*, genitalia.
Fig. 71.—*Holocentropus interruptus*, genitalia.
Fig. 72.—*Neureclipsis signatus*, genitalia.
Fig. 73.—*Hydropsyche recurvata*, genitalia.

OBITUARY.

Mr. Frank E. Moeser, a collector of Lepidoptera and a keen observer of their life histories, died at his home, 239 Guilford St., Buffalo, N.Y., on May 15th, being forty-five years of age. His work among the local Noctuidæ especially, proved of interest, in that material brought to notice by Grote, when the latter was with the Buffalo Society of Natural Sciences, was again collected by him. He is survived by a wife, daughter and son. H. Bird.

INSECTS AND PAIN.

BY HARRY B. WEISS, NEW BRUNSWICK, N.J.

In various books on entomology one often comes across the statement that insects do not suffer acute sensations of pain as do the higher animals. Different facts are cited to prove this, the most familiar being the case of a butterfly that was pinned alive, escaped and returned to its feeding among flowers with apparently no inconvenience. Kirby and Spence quote the action of a bee eating honey though deprived of its abdomen. Dr. John B. Smith found that if he cut off the abdomen of a fly it would live for twenty-four hours after, with practically no digestive system, very little nervous system and most of its heart gone and when the head was removed it lived for the same length of time. The interesting feature was that no apparent symptom of pain was developed.

It is also said that if a dragonfly be captured, held loosely by the wing and the tip of its abdomen presented to its mouth, it will proceed to eat at once as far as it can reach.

Referring to the human system many experiences commonly called painful are only unpleasant or disagreeable. This confusion is due to the fact that painful things are always unpleasant. Painfulness however is quite distinct from unpleasantness. The same stimuli which result in sensations of pressure, warmth and cold may also bring about painfulness if they are long continued or repeated often enough.

There are various theories accounting for pain sensations, the oldest one teaching that there were no specific pain organs, but that sensations of pain were brought about by continued or excessive reactions of other end-organs especially those of pressure. This theory was disproved by the discovery that certain anaesthetics destroyed pain sensations independently of pressure sensations. For instance if one's tooth is treated with cocaine, no pain is felt upon its removal but one is conscious of the pressure of the dentist's instrument.

Another theory is that pain is produced only by the excitation of distinct end-organs of pain. This theory is based on the discovery of pain spots on the skin. However the spots which are sensitive to pain and not to pressure have been found to occur

only on the elbow joints and membranous coverings of the eye. This lack of spots is explained by assuming that more stimulation is required to excite pain end-organs than pressure end-organs.

A third theory is that pain end-organs are not distinct from pressure end-organs but are exposed pressure organs situated under unusually thin parts of the epidermis and that pain is not due to any activity of these end-organs but to "a transformation in the gray matter of the spinal cord of nerve excitations conveyed from these exposed pressure end-organs."

Returning to insects we find that they have well developed nervous systems and that their organs are well supplied with nerve endings. Moreover many insects give signs of discomfort when handled or mutilated. There is no doubt but that they are highly susceptible to pressure stimuli. In fact end-organs of touch such as hairs and bristles are distributed over the entire integument.

Pain sensations however are hard to distinguish in insects from those of touch. One argues that the mutilated insects heretofore referred to experienced no pain simply because they exhibited no signs of suffering. What then constitutes a symptom of pain in insects? Who is qualified to judge? Many pain racked persons go about their duties without exhibiting any signs of pain other than changes in facial expression. Of course extreme mutilation of the human body results in almost immediate death while in the case of insects death is not immediate. All pain however is an exhausting experience and injurious to the organism. With insects final exhaustion is simply deferred.

In the case of the dragonfly eating its own body, it is hard to find a human parallel unless we cite mentally unbalanced persons who inflict serious injuries upon their person. One might argue that they would not do this if it were painful and yet we are positive such actions are painful.

The character of the insect nervous system is unlike our own and the surface of their bodies is usually rigid and hard and probably not sensitive to pressure and pain in the same way as our own bodies so that we have no reliable guides as to their sensations of pain. Man judges most things by himself and when this guide fails he is at a loss to explain certain happenings in a

satisfactory way. It seems therefore that the evidence for assuming that insects do not suffer acute sensations of pain is not by any means complete. We simply do not know and have no reliable means at present of finding out.

A NEW FOSSORIAL WASP FROM QUEENSLAND.

BY T. D. A. COCKERELL, BOULDER, COL.

Zoyphium crassicorne n. sp.

Male: Length about 5mm.; black, with the legs entirely orange; clypeus, labium and mandibles pale ferruginous, the clypeus with an inconspicuous dusky median patch; antennæ pale ferruginous, the flagellum with a dusky shade above; wings hyaline, stigma and outer nervures dark rufous, inner nervures pale ferruginous; front, vertex and mesothorax dullish, with extremely close, minute (microscopical) regular punctures; ocelli in a triangle, lateral ocelli not quite as far from eye as diameter of one; antennæ placed low down on face, distance from antenna to lower margin of clypeus rather less than distance of antennæ apart; antennæ clavate, 12-jointed, the scape short and thick, the club very large, compressed apically; face and lower half of front with short glittering hair, silvery on front, very pale golden on face; eyes slightly converging above; lower margin of clypeus with a pair of low rounded tubercles, far apart; mandibles with a large rounded tooth on lower margin; tegulæ short, pale rufo-testaceous; metathorax with short silvery hair at sides, its basal area with a fine median raised line, the apical half of which runs through a broad shining depressed or excavated area; tibiæ with apical part spinose; tibial, spurs stout, finely ciliate-denticulate; basal nervure going basad of transversomedial; marginal cell long, pointed on costa; three submarginal cells, the first receiving first recurrent nervure some distance from its end, the second triangular; abdomen shining, very minutely punctured, the apex presenting a broad slightly rounded truncation, with obtuse but salient angles.

Hab.—Brisbane (*H. Hacker*). Collected May 13, 1912. Queensland Museum 63. The type of *Zoyphium* is *Z. sericeum* Kohl, 1893. In Kohl's species the venation differs from that of *Zcrassi corne.* in some rather striking details; the second recurrent nerveur joins the second submarginal cell about the middle (far

beyond the middle in *crassicorne*), the third submarginal cell is as broad above as the length of the second transversocubital nervure (hardly more than half as broad in *crassicorne*), the median cell of the hind wings is obtusely pointed (very broadly truncate in *crassicorne*). Turner remarks: "None of the species of *Zoyphium* described by me have the tooth on each side of the second (first) dorsal segment mentioned by Kohl in his description of the genus"; *Z. crassicorne* is also without such a tooth.

From the other species of *Zoyphium*, *Z. crassicorne* is distinguished as follows:

(1) From *Z. erythrosoma* Turn. by the small size and quite different colour.

(2) From *Z. rufonigrum* Turn. by the black thorax. The male antennæ are very much thicker apically, with a very much larger club, than in *rufonigrum*; the penultimate joints in *crassicorne* are much broader than long. The tooth on the lower side of the mandibles is more broadly rounded than in *rufonigrum*.

(3) From *Z. kohlii* Turn. by the smaller size and red clypeus. The venation is also different; in *kohlii* the basal nervure goes more basad of the transversomedial, the marginal cell is shorter, and the second recurrent nervure joins the second submarginal cell about the middle.

(4) From *Z. frontale* Turn. by the three submarginal cells and the entirely black scutella.

(5) From *Z. doddi* Turn. by the larger size; first recurrent nervure joining first submarginal cell considerably more than three-quarters from base*; antennæ further from each other than from the eyes; hypopygium not produced into a spine at apex; eyes distinctly converging above. This is no doubt the nearest relative.

(6) From *Z. dipteroides* (Turn.) by the smaller size and black color,

(7) From *Z. funebre* (Turn.) by the orange legs, wholly black pronotum, &c.

(8) From *Z. rufipes* Rohwer by the smaller size, black thorax, &c.

In one view, the antennæ of *Z. crassicorne* appear broadly truncate at end.

*It joins the cell 608 microns from base and 128 from apex.

ON SOME CENTRAL AMERICAN DERMAPTERA IN THE UNITED STATES NATIONAL MUSEUM.

BY MALCOLM BURR, D. SC., LONDON, ENGLAND.

The following notes form a list of a number of Central American Dermaptera submitted to me for study. Although there are no species new to science among them, some of the records of scarce and little known species are of considerable interest.

Diplatys jansoni, Kirby.

Panama—Canal Zone, Paraiso, 5. ii. and 7-10. v., 1911, 2 ♂; 8-9. ii. and 22. iv., 1911, 4 ♀♀; 5. ii. and 1. v., 1911, 2 larvæ (Schwarz).

It was formerly suggested that *D. severa* Borm. was a mere melanic form of this species, but the two are undoubtedly distinct. It is desirable that the genital armature of the American Diplatyinæ be examined, for which purpose material in alcohol is urgently needed. New genera will probably be required for this and the following species.

Diplatys jansoni superficially resembles a staphylinid beetle.

Diplatys gracilis Stål.

Panama—Canal Zone, Porto Bello, 20. ii., 1913. ♂. (Schwarz.)

This species has not hitherto been recorded from Central America, but only from Peru and Brazil. It is a rare insect in collections. I consider *D. sahlbergi* a mere variant.

Pyragra fuscata Serv.

Mexico—Omealca, V. C. 16. iv., 1908. ♀ and larva. (Knab.)

Guatemala—Dept. Solola, Olas de Moka, 3000 feet., ix., 1908. 2 larvæ. (Engelhardt.)

Echinopsalis guttata Borm.

Panama—Porto Bello, 25. ii., 1911, and Paraiso, 17. i., 1911, both larvæ. (Schwarz.)

Recorded from Nicaragua, Costa Rica and Colombia. It is a rare species.

Eulabis saramaccensis Zach.

Panama—Canal Zone. Frijoles, 1 ♂; Paraiso, 19. i., 1911, 1 larva; 5. ii., 1911, 1 ♂, "in fruit trap"; 21. iii., 1911, 1 ♂; 3. v., 1911, ♂ ♀. (Schwarz.)

This species has but recently been described by Zacher from Surinam. In nature specimens have probably often been mistaken for *Anisolabis annulipes*.

Psalis americana Beauv.

Panama—Porto Bello, 27, iii., 1912, 2 larvæ. (Busck.)

Labidura riparia Pall.

Mexico—Tampico, vii., 1912, 1 ♀. (Schwarz.)

Spongophora croceipennis Serv.

Guatemala—Dept. Solola, Olas de Moka, 3000 feet, ix., 1908, ♂. (Engelhardt.)

Costa Rica—Tuis. 2400 feet, ♀. (Lankester.)

Purex frontalis Dohrn.

Costa Rica—La Florida, 500 feet. 2 ♀. (Lankester.)

Recorded from Peru and Ecuador.

Purex parvicollis Stål.

Panama—Porto Bello. 25. ii., 1912, ♀. (Schwarz.)

A very scarce species, only known Rio de Janeiro (Stål), and a contemporary specimen in my own collection.

Vostox similis Borm.

Mexico—Orizaba. 13. iii., 1908. ♀. (Knab.) Vera Cruz, Cordoba. 24. ii., 1908. ♀. (Knab.)

Panama—Canal Zone, Tabernilla. 9. v., 1907. ♀. (Busck.)

This species has remained unrecognized since its description by Bormans from specimens from Colombia. I only know of his original specimens in the Vienna Museum and in my collection.

Vostox insignis Stål.

Panama—Canal Zone, Tabernilla. ♂. (Busck.) Lion Hill. ♂. (Busck.) Paraiso. 20. ii., 1911. ♀. (Schwarz.)

Spongovostox ghilianii Dohrn.?

Panama—Canal Zone, Paraiso. 5. iv., 1911. ♀. (Schwarz.)
Mexico—Tampico. vii.; 1912. 1 ♂. 2 ♀. (Schwarz.)

Spongovostox alter Burr.

Panama—Canal Zone, Paraiso. 9. ii. and 2. iv., 1911. ♂♂. (Schwarz.)

Spongovostox apicedentata Caud.

Mexico—Aguas Calientes. ♂. (Schwarz.)

Labia curvicauda Motsch.

Panama—Canal Zone, Paraiso. 1. ii., 1911. 1 ♂, 2 ♀. 25. iv., 1911. 1 ♀. (Schwarz.)
A cosmopolitan species.

Labia equatoria Burr.

Panama—Porto Bello. 20-25-26. ii., 1911. 2 brachypterous and 2 macropterous ♀. (Schwarz.)

Labia bilineata Scudd.

Panama—Canal Zone, Paraiso. 5. iii., 1911. ♀. (Schwarz.)

Prolabia formica Burr.

Panama—Canal Zone, Paraiso. 1 ♂, 14 ♀ and some larvæ. Numerous dates, January-May, 1911. (Schwarz.)

Prolabia annulata Beauv.

Panama—Canal Zone, Paraiso. 2 ♂, 6 ♀. January-May, 1911. (Schwarz.). Frijoles, "on flowers of Lengua de Vacca", ♀. (Schwarz.) Tabernilla. 1. v., 1907. ♂, ♀. (Busck.) Bohio. 7. ii., 1911. ♀. (Schwarz.) Port Limon. ♂. (Knab.)
This species has been discussed in detail by me in Proc. U. S. Nat. Museum, and I have not altered the opinions there expressed.

Prolabia arachidis Yers.

Guatemala—Champerico. 3. viii., 1908. ♂. (Knab.)

Prolabia mexicana Borm.

Mexico—Vera Cruz, Cordoba. 23. iv., 1908. ♀. (Fenyes.)

Sparatta nigrina Stål.

Panama—Porto Bello. 27-28. ii. and 12. iii., 1911. ♂, 2 ♀. (Schwarz.)

Doru lineare Esch.

Panama—Canal Zone, Tabernilla. 14. vi., 1907. ♀. (Busck.)

Mexico—Vera Cruz, Cordoba. 2-11. iii. and 26. iv., 1908. 3 ♂, 3 ♀. (Knab.)

It is interesting to note that by external characters this genus scarcely differs from *Forficula*, except in the slender forceps and spined pygidium. The validity of the genus is confirmed by a study of the genital armature. The metaparameres are regularly convex externally, straight internally and acute at the apex, which is unusual in *Forficula*.

Doru bimaculatum Fabr. will have to be removed to a distinct genus, as the metaparamera are apically rounded, as in *Forficula*, but it differs in several features from that genus.

Ancistrogaster variegata Stål.

Panama—Canal Zone, Paraiso. 10. iv., 1911. ♀. (Schwarz.)
Mexico—Vera Cruz, Cordoba. 10. ii., 1908. ♀. (Knab.)

Ancistrogaster spinax Dohrn.

Guatemala—Dept. Solola, Olas de Moka, 3000 feet. v., 1908. 1 ♂, 2 ♀. (Engelhardt.)

Vlax toltecus Borm., or **intermedius** Burr.

Mexico—Vera Cruz, Orizaba and Cordoba. 13. ii., 1908. 2 ♀. (Knab.)

Dinex americanus Borm.

Panama—Canal Zone, Bohio. 7. i., 1911. 2 ♂. (Schwarz); (one is of the form originally figured by de Bormans, the other has the anal points and armature of the forceps scarcely developed). Paraiso. 26. i., 1911. ♀. (Schwarz.) Frijoles, "on flowers of Lengua de Vacca." ♂. (Schwarz.)

Neolobophora ruficeps Burm.

Panama—Canal Zone, Culebra. ♂. (Rousseau.)

A REVIEW OF THE WORK ON THE POISONED BAIT SPRAY, DRY METHOD AND MIXED TREATMENT OF CONTROLLING FRUIT FLIES (TRYPETIDÆ).

BY HENRY H. P. SEVERIN, PH.D., MILWAUKEE, WIS.

(Continued from p. 246).

Olive Fly (*Dacus oleæ* Rossi.).

After the Italian entomologists, De Cillis and Berlese, had demonstrated the effectiveness of the poisoned bait spray to control the olive fly, Chapelle (2 and 3) and Ruby, of France, carried on a series of similar spraying experiments to combat this same pest, and confirmed the results obtained in Italy. The work of the Italian entomologists with the dry method and mixed treatment of controlling the olive fly was also tested by the French scientists.

In 1907 two of Dr. De Cillis' formulas (Table II) were used by the French scientists. As some of the ingredients of these formulas were rather expensive, Dr. Berlese began to experiment along more economical lines, and in 1908 one of his formulas (Table II) was tested. The following table shows the formulas which were used in France from 1907-1909:

TABLE II.

	1907	1907	1908	1909
Molasses (45 to 50% sugar)	65	40	98	90
Honey	31	40	..	
Sodium arsenate	2	2	2	2
Glycerine	2	..	..	..
Water	..	18	..	10

In 1907 the formulas were diluted in the proportion of 10 kilogrammes of the solution to 100 liters of water, but in the next two years 20 kilogrammes of the solution to 100 liters of water was used. The 20% concentration gave the diluted solution a syrupy consistency and consequently a better adherence to the leaves.

The number of applications of the spray, dose per tree and cost, including labour, was as follows:

	1907	1908	1909
Number of applications of spray	5-6	3-4	6
Dose per tree	.5-1	.3-.5	.5 liters
Cost of treatment per tree	4-9	1 1/5-1 3/5	4 cents

The first application of the spray was made about fifteen days before the egg-laying period began. The bait was uniformly ap-

plied to the interior and exterior of the tree, so that the droplets adhered to the upper and lower surfaces of the leaves. The time required to spray one tree was estimated at half a minute to a minute.

Non-isolated orchards.—During a number of years spraying experiments were carried on in a number of olive gardens which were adjacent to one or more untreated olive plantations, and consequently more intimately exposed to the invasion of the fly. In 1908 three small orchards encircled by neighbouring olive groves were treated. In 1909 a number of orchards composed of about 2,000 trees, and in contact at numerous places with neighbouring olive gardens, was sprayed. In 1907 two non-isolated orchards were sprayed. The first contained about 2,500 trees, and was encircled by olive groves. The second was composed of about 3,000 trees, grouped in a score of orchards, and was situated at the junction of two rivers and rose in a succession of terraces on the side of a hill to an elevation of 600-800 meters. The results obtained are shown in Table III. The two columns of figures under the heading, "olives infested in treated orchard," represent different varieties of olives, the same variety being used as a check under the heading, "olives infested in untreated orchard." Compare the first column of figures with the third, and the second with the fourth.

TABLE III.

Number of trees.	Applications of spray.	Olives infested in treated orchard.		Olives infested in untreated orchard.	
		%	%	%	%
145	4	32.5	40	60.25	80.5
150	4	31.75		62.5	
630	4	7.5	15.5	10.	36.25
		Periphery			
2000	6	17	33.8	73.	82.
		Centre			
		4	5.6		
		Periphery			
2500	5	71.2	68	96	97.4
		Centre			
		51.25	47.75	89	87.5
		Along river			
3000	5	54.3	48.4	76.1	76.1
		50-100 meters on hill			
		37.9	29.3	70.1	70.1

From this table it is evident that in the small, non-isolated olive gardens the treatment reduced the infestation between 40 and 50 %. According to the authors, by increasing the number of applications of the spray, the infestation could be reduced still more.

The Italian entomologists obtained excellent results in small, non-isolated olive groves by applying 6-7 sprays. It would be necessary to renew the bait after each heavy rain.

In the large, non-isolated olive groves the central part is protected by the spray, while the fruit along the periphery is generally attacked by the maggot in a proportion which increases according to the nearness of the infested olive plantations not treated.

Isolated orchards.—During a number of seasons Chapelle (2) and Ruby conducted a series of spraying experiments in small, isolated olive gardens. In one experiment 620 trees were sprayed during two successive seasons. This orchard was isolated by about one kilometer (3,280.8 feet) from other olive groves. The results obtained are given in Table VI.

Olive groves containing 10,000 trees were treated with the dry method of control in 1911 (Table VII) and with the poisoned bait spray in 1912. These olive gardens were scattered over a large area, and were owned by a score of proprietors. The vast area of olive trees was well isolated, being situated at a distance of 500-600 meters from the neighbouring olive plantations.

The insecticide was composed of 15 kilogrammes of molasses, 2½% of sodium arsenate in 100 liters of water. One application of the spray was made on July 8, just previous to the emergence of the first brood of olive flies, and another treatment was given on September 6, at the time when the second brood of flies were issuing. The second spray was applied to the more exposed parts of the large area of olive trees, only two-thirds of the orchard being treated. One man was able to spray 700-900 trees in a day. Each tree received about .3-.4 of a liter of the bait. The cost of the treatment, including labour, was estimated at 1 cent per tree. The results of examining the crop on October 5 and November 5 are recorded in Table IV.

TABLE IV

	Olives infested in treated orchard.						Olives infested in untreated orchard.					
	%	%	%	%	%	%	%	%	%	%	%	%
Oct. 5, 1912		4	2		7		63		57	56		
Nov. 5, 1912	10	6.5	5	9	6	14	60.5	66.5	85.33	75	100	81

It is unquestionable that the isolation and perfect homogeneity of the olive groves treated contributed to this remarkable success. The authors emphasize the need of co-operation of olive growers in the same vicinity, so that a large area of olive trees may be treated.

The attack of *Dacus* upon olives results not only in the premature dropping of the fruit, but also causes a very serious diminution in the yield of the oil. Figures are given to show that in order to produce the same quantity of oil, the ratio of olives required from untreated to treated trees is about 5-3.

Dr. Cazeneuve (2) declares that mortal accidents have occured with animals which have eaten sprayed olives or vegetation growing underneath or in the neighbourhood of treated trees. The authors could not confirm any accidents of this kind.

Can arsenic be found in the manufactured oil of olives obtained from treated trees? Chemical tests by Gassend (2) of olive oil obtained from olives taken from trees sprayed 2 or 3 days before the crop was gathered showed traces of arsenic estimated at less than .000001 gr. per liter. Negative results were obtained with the oil when the normal interval elapsed between the last application of the spray and the harvesting of the olives.

The poisoned bait spray has some disadvantages. According to Berlese, the spray stains the olives. The insecticide also stimulates the development of fungi when a low per cent. of sugar is present in the sweet substance, but in order to overcome this difficulty, the bait ought to contain at least 30% sugar (glucose or saccharose). According to the French scientists the fear of propagating fungi with heavy and numerous doses of the spray disappears from the work of 1912. The small quantity of diluted molasses is washed off with the first heavy rains.

Dry Method.

The dry method of controlling fruit flies consists in suspending in the trees, a container holding the poisoned sweets in such a way that the bait is constantly within the reach of the rapidly flying fruit fly. This system would have the advantage of (1)

abolishing spraying and thus warding off the danger from fungi; (2) reducing the cost of labor; (3) overcoming the unfavourable action of rains which wash off the sweet ingredients of the spray and (4) doing away with the inconvenience of lack of water in certain regions. In southern Italy the fruit fly remedy offers a serious difficulty on account of lack of water to dilute the stock solution, but with the dry method of control very little water is used.

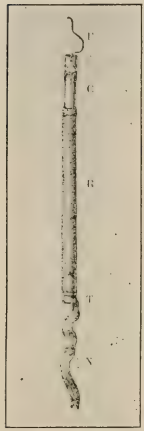

FIG. 23.—Tube containing poisoned molasses; F, suspending wire; C, bamboo; R, roll of blotting paper; T, cork; N, canvas ribbon. (After Berlese).

One system used in France in 1908 and classed under the dry method of controlling the olive fly was to place the poisoned bait in a bottle provided with a cork through which passed a wick. This wick extended into the poisonous mixture and acted like the wick of a lamp. The molasses was slightly diluted with water and mixed with potassium or sodium arsenate (2%).

This dry method of control was used in 232 and 340 trees of two isolated olive orchards. In the olive garden containing 232 bottles, from 5.75 to 6.75% of the olives were maggoty, whereas in an untreated olive grove bearing the same variety of olives, from 6.75 to 22.75% were infested. The results of the second experiment are recorded in table V.

TABLE V.

Method of Treatment.	Number of trees.	Olives infested in treated orchards.		Olives infested in untreated orchards.	
		%	%	%	%
1907 sprayed	340	33.25	9.9	80.75	98.75
1908 bottles	340	8.8	12.6	69.4	79.4
1909 sacs	340	11.34	14.0	40.57	58.33

The results of the last experiment appear most encouraging but it must be noted that this olive garden was well isolated and had been sprayed with success during the previous year; it may be possible that there was a reduction of the pest during the year when this dry method of control was used.

Another system classed under the dry method of control was tried on a small scale in France in 1908 and on a large scale in 1909. This method consisted in suspending in the tree a canvas sac (10-14 inches in length and about 2 inches in diameter), which contained about 1½ lbs. of a mixture of poisoned molasses, sawdust and bran (Fig. 24). The insecticide transudes directly through the canvas and when a rain washes off the bait, the poisoned molasses filters through again. The proportion of the ingredients used in the canvas sacs was as follows:

Arsenical molasses	71%
Sawdust	21%
Bran	8%

An excess of bran gives too much porosity to the mixture and favors evaporation. The addition of water to the molasses accelerates dessication, a thing to avoid most. To lessen dessication it is necessary to tightly stuff the sacs. After filling the bags, drops of liquid ooze out and this loss can be avoided by allowing the sacs to drain over a vessel for several hours or even two days.

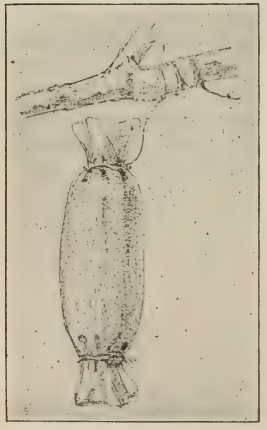

FIG. 24.—Canvas sac stuffed with a mixture of bran and poisoned molasses. (After Beriese).

The sacs thus prepared are placed in the interior of the trees at a region as accessible as possible. Once during the summer, water was added to the bags on account of the sacs becoming dry at their upper end; this was due to the oozing of molasses through the canvas and to evaporation. Later when the first rains and dew of September occur, the atmospheric humidity insures excellent conditions. The cost, including all expenses, amounted to $4.00 per sac. The results obtained in two isolated olive gardens are given in tables V and VI.

TABLE VI.

Method of Treatment.	Number of trees.	Olives infested in treated orchard.		Olives infested in untreated orchard.	
		%	%	%	%
1907 sprayed	620	7.5	17.5	80.75	98.75
1908 sprayed	620	1.8	1.4	69.4	79.4
1909 sacs	620	16.0	14.0	40.57	58.33

It is evident from tables V and VI that the use of these sacs in isolated olive gardens did not give as good results as the use of the poisoned bait spray during the previous years.

In a non-isolated orchard containing 675 olive trees, each tree was provided with a sac. This orchard had never been sprayed. The results showed that 15 to 32.5% of the olives were infested in this olive garden, whereas in a neighbouring olive plantation bearing the same variety of olives 26 to 39.67% were attacked by the pest. It is apparent that little value can be attributed to this dry method of control in a non-isolated olive grove.

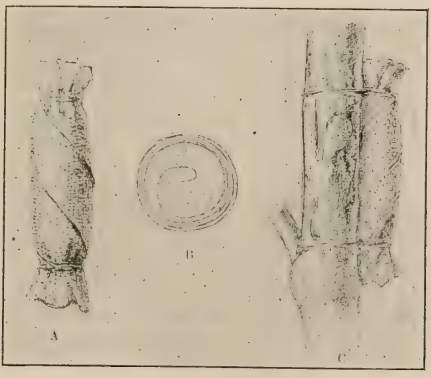

FIG. 25.—A, roll of absorbent paper stuffed with a mixture of bran and poisoned molasses; B, same in section; C, fastened to a branch. (After Berlese).

A third system classed under the dry method of control was to wire to the branches of an olive tree, a sheet-iron or galvanized-

iron pan (about 14-20 inches in diameter; 6-8 inches deep) containing the poisoned molasses. Pieces of rags floating at the surface of the poisonous mixture, enable the insect to come to rest within reach of the bait. Each pan contained about 2 kilogrammes of poisoned molasses (3% arsenate of soda) diluted with a small quantity of water. The evaporation during the dry summer caused the molasses to lose its syrupy state and 2 liters of grape juice were added to each pan. In 1910 this dry method of control was undertaken in two isolated olive gardens. A glance at table VII shows the results obtained,

During this same year, this method was tested on a large scale in Italy under the direction of Dr. Berlese. The results as published by this scientist were most favourable.

In 1911, Chapelle (2) and Ruby repeated the experiment on a large scale. A score of olive groves containing 10,000 trees was selected. This large area of olive trees was isolated by 500-600 meters from the neighbouring olive plantations. The pans were regularly distributed at the rate of 1 for every 40 trees. Each pan contained from 5-6 liters of the following solution:

Molasses.....15 kilogr.
Sodium arsenate..... 3 „
Salt water .....100 liters

From the beginning of summer up to the first rains of autumn, 6 liters of water was poured into each pan. The results are shown in table VII.

TABLE VII.

	Number of pans.	Number of trees.	Olives infested in treated orchard.				Olives infested in untreated orchard.			
			%	%	%	%	%	%	%	%
1910	13	620	25.65				18.40			
1910	80	3,000	1.66	1			8.0	2.8		
1911	250	10,000	14.1	25	44.67	0	7.0	8.0	1.32	2

According to the figures in the above table the treatment with the use of the pans has no practical value.

The three systems classed under the dry method of control as practised by the French entomologists have not given as satisfactory results as the poisoned bait spray.

(To be continued.)

THE THIRD GENUS OF THE FAMILY ELASMIDÆ (HYMENOPTERA).

BY A. A. GIRAULT, NELSON, N. Q., AUSTRALIA.

The following genus and species was found just too late to be included within the supplement to the Elasmidæ (memoirs Queensland Museum, II., 1913). It was first mistaken for *Euryischia* Howard, the species being characteristic for that genus because of its slenderness and pale legs. The genus differs from *Euryischia* in bearing complete parapsidal furrows, a slender, conical abdomen, and in lacking the prominent projection caudad of the submarginal vein near its apex, moreover the coxæ are not compressed but cylindrical. Otherwise, it is very similar to Howard's genus *in all details* and in general appearance.

Family Elasmidæ.

Euryischomyia, new genus.

Type—The following species:

Euryischomyia washingtoni, new species.

Female—Length, 1.00 mm. Slender, the abdomen conic-ovate. Jet black and like the species of *Euryischia*, but the legs, except hind coxæ and femora, lemon yellow, also the tegulæ and the fore wings bear a clearly delimited, broad, jet black band across them under the marginal and most of postmarginal veins, the distal margin just reaching apex of stigmal vein, the proximal margin nearly straight; wings otherwise hyaline. Scutum with hardly more setæ than the scutellum which is nearly naked, the few sparse setæ whitish. Thorax finely scaly. Mandibles bidentate, the second tooth broadly truncate. Two ring-joints, the three funicle joints subquadrate, the third wider than long. Bristles under submarginal veins short, not more than two. Submarginal vein entire and continuous. Hind coxæ greatly enlarged, cylindrical, ovate; the hind femora compressed. Tarsi 5-jointed.

Male—The same but the abdomen shorter, more obtuse at apex.

Described from one male, two female specimens captured August, 1914.

January 8, 1913, by sweeping in forest along the banks of Cape River.

Habitat—Capeville (Pentland), Queensland.

Types—In the Queensland Museum, Brisbane, one male, one female on a slide.

The species is respectfully dedicated to Booker T. Washington.

HORMOMYIA BULLA, N. SP.

BY E. P. FELT, ALBANY, N. Y.

1867. Walsh, B. D., Ent. Soc. Phil. Proc., 6, p. 226.
1894. Brodie, Wm., Biol. Rev. of Ont., 1, p. 74.
1909. Jarvis, T. D., Ent. Soc. Ont. 39th Rep't, p. 83.
1912. Cosens, A., Can. Inst. Trans., 9, p. 317.

The midge, previously unknown, produces a subgobular, yellowish gall, about the size of a large pea, on Helianthus leaves. The deformities are about equally prominent on both sides of the leaf and located irregularly, though usually near the mid rib. This species has been recorded from the Province of Ontario by the late Dr. Brodie, and has been reported as common at Evanston, Ill., by Mr. L. H. Weld, who reared the adults described below, July 23, 1907, and who states that the gall occurred commonly at North Evanston, Ill., on plants growing in a deep, black, rich soil along with compas plants. The gall of *H. helianthi* Brodie Mr. Weld reports as very local at Evanston, Ill., it being found by him in September, whereas the gall of *H. bulla* occurs in July. Unfortunately, the account by Walsh gives only an incidental mention of the gall of *H. bulla*, and we are therefore unable to credit him with having characterized the species. The midge is closely allied to *H. helianthi* Brodie, from which it may be readily separated by its smaller size, longer stems of the antennal segments in the male, and the distinctly longer palpi of the female.

Male.—Length 1.5 mm. Antennæ extending to the third abdominal segment, sparsely haired, pale yellowish; 14 segments, the fifth with stems 1¼ and 1½ times their diameters, respectively;

the basal enlargement subglobose, the distal broadly oval, with a length ¼ greater than its diameter; the basal circumfili extending to the distal third of the basal portion of the stem, the distal circumfili nearly to the apex of the segment; terminal segment slightly reduced, the stem with a distinct swelling near the middle, the distal enlargement broadly fusiform, with a length about twice its diameter, the apex obtuse. Palpi; first segment short, subquadrate, the second greatly produced, angularly curved, slender, with a length fully seven times its diameter (another male has three papal segments, the second and third subequal). Mesonotum reddish brown. Scutellum and postscutellum fuscous yellowish. Abdomen rather thickly haired, dark reddish brown; genitalia fuscous yellowish. Wings hyaline, costa dark straw. Halteres yellowish. Coxæ and femora basally pale yellowish, the distal portion of femora and the basal portion of tibiæ dark straw, the distal part of tibiæ and the tarsi yellowish. Claws slender, evenly curved, simple, the pulvilli as long as the claws. Genitalia; basal clasp segment short, broad, the terminal clasp segment long, tapering to a subacute toothed apex; dorsal plate broad, broadly and triangularly emarginate, the lobes divergent and broadly rounded; ventral plate short, tapering to a broadly rounded apex.

Female.—Length 3 mm. Antennæ extending to the base of the abdomen, rather thickly haired, brownish yellow; 14 segments, the fifth with the stem about ¼ the length of the cylindric basal enlargement, which latter has a length about twice its diameter, the distal third with coarsely reticulate circumfili; terminal segment cylindric, with a length over twice its diameter, broadly rounded apically. Palpi; first segment subquadrate, the second twice the length of the first, rather stout, the third ½ longer than the second, fusiform. Mesonotum shining dark brown. Scutellum and postscutellum fuscous yellowish. Abdomen thickly haired, brownish yellow, the ovipositor somewhat fuscous. Wings hyaline, costa dark brown. Halteres yellowish basally, fuscous apically. Coxæ and legs mostly a fuscous straw. Ovipositor when extended about ½ the length of the abdomen, moderately stout; terminal lobes with a length ½ greater than the width, the apex broadly rounded and sparsely setose. Type Cecid No. 1267.

A NEW SPECIES OF MYMARIDÆ FROM AUSTRALIA.

BY A. A. GIRAULT, NELSON, N. Q., AUSTRALIA.

Genus *Stethynium* Enock.

1. **Stethynium cinctiventris,** new species.

Female.—Length 0.80 mm. Habitus of *Anaphes*.

Black, the abdomen with a broad band of silvery-white around its base, occupying nearly a third of the surface; scutum more or less pallid, especially at caudal half, the parapsides and scutellum white. Legs white or nearly, the antennæ black, the first three funicle joints cylindrical, the second longest, 1 and 3 more or less equal, a third shorter than 2; 6 subglobular, a third shorter than 5, while 4 is a fourth shorter than 5; proximal club joint nearly half of the club. Fore wings rather narrow and graceful, with about fourteen lines of discal cilia across the widest part of the blade, the longest marginal cilia about half the greatest width. Hind wings rather narrow and curved, with five lines of fine discal cilia near tip, the third and fourth lines soon disappearing. Strigil present. Scutellum rectangular, the mesopostscutellum much longer than it and joined to the phragma (two pairs of sclerites between scutellum and postscutellum). Fore wing with a more or less distinct subfuscous stripe across it at about the middle. Valves of ovipositor slightly exserted. Tibial spurs single.

Male not known.

Described from one female captured by sweeping in a jungle pocket, September 3, 1913 (A. P. Dodd).

Habitat.—Nelson (Cairns), Queensland.

Type.—In the Queensland Museum, Brisbane, the above specimen on a slide with the following specimen:

Genus *Anaphoidea* Girault.

1. **Anaphoidea galtoni** Girault.

Male.—Funicle joints each a little over twice longer than broad, otherwise like the female.

From one specimen captured with the female type specimen (Roma, Queensland).

August, 1914

GEOMETRID NOTES — WITH DESCRIPTIONS OF NEW SPECIES AND VARIETIES.

BY L. W. SWETT, BOSTON, MASS.

Stamnodes pearsalli, n. sp.

Expands 34 mm. Palpi short, pinkish-tinged; head roseate gray, between the antennæ is a reddish line. Thorax and abdomen fawn-coloured, tinged with reddish. Wings fawn-coloured or grayish brown, with a pinkish tinge in the fringe and on the costa. There are four black patches on the fore wing at the costa; from the body to the first spot the costa is reddish. The first black spot is about 3 mm. from base of wing; between first and second black spots there is a whitish streak, beyond which the costa is grayish. The third spot is about 10 mm. from base of wing and is larger than the others; it is apparently the beginning of a faint black line or shading, which runs out almost at right angles with costa to M_1, then runs back in a straight line until it reaches the inner margin at about two-thirds out. This line is shaded with white on the outside, and shows as a white patch at the costa, about 1 mm. in width. Beyond, to the outer margin, the wing is fawn without markings, except a fourth black patch near the apex; fringe long and pinkish. I can see no discal spots on hind or fore wings. Hind wings fawn-coloured like fore wings, but without markings. Beneath the markings are much more striking than above. Costa grayish with pinkish striations to the third black spot or about 12 mm. out from base, there is a trace of a faint white line beyond. Near the apex is an oblong gray patch surrounded with reddish striations. At the end near the apex there are two sharp teeth. Perhaps in some specimens this patch might be called triangular. The entire central portion of the fore wings is lightish and rather transparent. On the outer margin, just below apex, is a reddish triangular spot. The hind wings are fawn-coloured, densely striated with red. Towards the outer margin and running for a short distance with M_1 is a red line, running from just above centre of the wing towards outer margin, and fading out just before reaching there. From inner margin another broad, red line runs toward outer margin for about 4 mm., then fades from sight; it is shaded by a white line.

August, 1914.

Holotype.—One ♀ from Mt. Lowe, California, April 11, 1913, received through the kindness of Mr. Harry H. Newcomb.

I take pleasure in naming this species after my friend, Mr. R. F. Pearsall, who has done so much to clear up this group.

Cleora newcombi, n. sp.

Expands 29–30 mm. Palpi short and grayish, head whitish between the antennæ. Fore wings dark gray, heavily striated with black, body and thorax dark gray, the body with characteristic geminate black spots. The basal black band is quite broad on fore wings, starting from a black patch on costa, about 4 mm. out from base, and curving in towards body. The line is geminate with black shading. Beyond this line, about the centre of the wing, a line starts from the black spot on the costa and runs straight across the wing to the inner margin. About three-fourths out from body a third black line runs sinuately across the wing, bending in towards body as it reaches inner margin at about the middle. This black line is accentuated on the veins by black dots. Beyond there seems to be a double row of lunules, gray centred and blackish outside; about the centre of the fore wing at outer margin they form a patch much lighter than the rest of the wing. The discal spot, when present, is very faint. Hind wings of same colour as fore wings, basal band black, running in a regular curve to outer margin, the black discal spot large and prominent. Extra discal black line very close to discal spot; starting from inner margin it curves upward towards discal spot, then suddenly runs straight to outer margin. Quite close to this extra discal line and running parallel to it is another somewhat paler line; beyond there is a clear space, then a curved, wide, black band shaded with whitish and appearing almost as lunules. The scollop of the hind wing is bounded by a narrow black line, fringe long and grayish. Beneath fore wings lighter gray than above, except towards the body and on costa, where it is heavily striated with black. There is a prominent black discal spot, but no further markings, except the black shadings. Hind wings pale ashen with no lines or markings except black discal spot.

Holotype.—One ♂, Venice, Calif., July 11, 1913, H. H. Newcomb.

Paratype.—One ♂, Venice, Calif., May 6, 1913, H. H. Newcomb.

I take pleasure in naming this species after my friend, Mr. H. H. Newcomb, who has rendered me valuable assistance in the way of specimens.

Sicya macularia, var. **lewisi,** n. var.

Expands 26 mm. Palpi a little longer than *macularia*, shaded with pink. Wings shaped much as *macularia*, but with less of a curve below apex, outer margin being straighter. Wings lemon yellow without markings to outer margin, except rosy shading along costa, a minute black discal spot and a red spot on centre of inner margin. A reddish brown line runs from near apex to inner margin beyond this line, the entire outer margin is chocolate brown. Along the median vein there is a chocolate shading, but so pale as to look like a streak. The hind wing is paler than fore wing, a reddish, irregular line runs from inner margin to outer in a curve. Beyond this line the margin is chocolate colour, as the fore wing. Beneath the fore wings are marked as above, with chocolate outer margin. Hind wings have small reddish discal spot, and the outer line appears as spots on the veins, outer margin pale chocolate.

Holotype.—One ♂, Mt. Wilson, Calif., July 11, 1913, H. H. Newcomb.

I name this variety in memory of my father, Lewis Swett, who assisted me in many ways in building up my collection of Geometrids.

This seems to be a distinct species, but *macularia* is so variable it is possible that this is a tendency towards melanism, and I prefer to regard it as a variety.

Cingilia catenaria, var. **immacularia,** n. var.

Expands 40 mm. This variety has the same colourings as to head, thorax and body as the normal form. The wings are smoky white, without any trace of lines, except a black dot close to body, just beyond this is a faint dot on costa, then on median vein and on vein 1A. The edge of the wing has minute black dots at end of veins. Beneath the wings are paler than above, only the black

discal spots showing through. This, apparently, is a rare variety and worthy of name, it is so entirely different from the common *catenaria*.

Holotype.—One ♂, Norway, Maine, S. J. Smith.

All the types described in this paper are placed in my collection at the Museum of Comparative Zoology, Cambridge, Mass.

THE MONTREAL BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The following Resolution was unanimously passed at a meeting of the Montreal Branch and copies have been forwarded by the Secretary to the relatives of the late Henry H. Lyman.

Resolved:—"That the members of the Montreal Branch of the Entomological Society of Ontario have learned with great sorrow, that when the 'S. S. Empress of Ireland' sank on the 29th day of May, she had on board one of our oldest and most active members, Mr. Henry Herbert Lyman, accompanied by Mrs. Lyman, and that both are amongst those who are lost.

From the time that Mr. Lyman joined our Society in 1875 up to the Annual Meeting held last month, in his successive capacities as a Member of the Council, President, Vice-President and Treasurer, he has been so intimately connected with the work we have been able to accomplish that it is difficult to realize and express the extent of the loss we have sustained.

His wide knowledge of the butterflies, both in nature and in literature, his extensive travels to the great museums of this Continent and of Europe, his friendly help and criticism, and frequent hospitality at his late residence 'Thornhill' where so many enjoyable meetings have been held, will long be gratefully remembered; as well as the encouragement in the study of Nature produced by his numerous papers published in the various scientific periodicals, which papers he invariably read first at our gatherings.

We beg to extend to the members of his family the expression of our sympathy in their double bereavement, and assure them that the feeling of loss is not confined to this City, but is shared by Entomologists throughout America and beyond the seas."

GEO. A. MOORE, SECRETARY.

SOME PROCTOTRYPOID EGG-PARASITES OF SUGAR-CANE INSECTS IN JAVA.

BY ALLAN P. DODD, NELSON, N. Q., AUSTRALIA.

In a small collection of egg-parasites received from Mr. P. van der Goot, Entomologist, Javan Sugar Experiment Station, Pasoeroean, Java, were three vials containing Proctotrypoidea as follows:—

No. 1.—"Bred from the eggs of *Diatrea striatalis.* Described by Dr. Zehnter as *Ceraphron benificiens* Zehnter." In "Des Zuckerrohrund seine Kulter," Kruger, 1899, p. 350, *Ceraphron benificiens* Zehnter is figured. The specimens received agree entirely with this figure, and I have no doubt the specimens received by me are Zehnter's *Ceraphron benificiens.* This species is not a Ceraphron, but belongs to the family *Scelionidæ*, subfamily *Telenominæ*, genus *Phanurus* Thomson, and should, therefore, be known as *Phanurus benificiens* Zehnter.

No. 7—"Reared from eggs of an unknown moth on leaves of sugarcane." These parasites are the same as the foregoing, namely *Phanurus benificiens* Zehnter.

No. 5—"Reared from eggs found on sugarcane; eggs enclosed." The eggs are probably those of a *Pentatomid.* The parasite is herewith described:—

Family *Scelionidæ.*

Subfamily *Telenominæ.*

Genus *Telenomus* Haliday.

1. Telenomus saccharalis, sp. nov.

Female—Length 0.55 mm; very small for the genus. Coal black, legs and antennæ golden yellow, last four antennal joints dusky yellow.

Antennæ 11-jointed, scape slender, equal to combined length of pedicel and funicle joints; pedicel much wider and longer than each funicle joint; funicle joints small; first and second funicle joints subequal, longer than wide; third shorter; fourth as wide as long; fifth transverse; club 4-jointed, much wider than funicle, its joints much wider than long, second the widest.

Forewings narrow, hyaline; when closed extending beyond tip of the abdomen; marginal cilia long, equal to one-third greatest wing width; the discal cilia very fine and dense; submarginal vein attaining the costa at about two-fifths wing length; the marginal vein nearly as long as the stigmal which is oblique, knobbed at tip; the postmarginal twice as long as the stigmal.

Abdomen much narrower and shorter than the thorax.

(From one specimen, two-thirds inch objective, one inch optic, Bausch and Lomb.)

Male—Antennæ 12-jointed, first and second funicle joints small, a little longer than wide; third distinctly longer, as long as pedicel; fourth and fifth subequal, as wide as long; six-nine subequal, wider than long; last joint as long as pedicel.

The male type has the fifth and sixth funicle joints of one antenna, and the sixth and seventh of the other united in one joint.

(From one specimen, same magnification). Described from a ♂ and a ♀, labeled as above.

Habitat—Java.

Host—Eggs of a Pentatomid (?).

Types—In the Queensland Museum, Brisbane, Q'ld, a male and a female on a slide together.

DEPARTMENT OF ENTOMOLOGY—ONTARIO AGRICULTURAL COLLEGE, GUELPH.

After a long connection with the College, extending from his student days to the present year, Mr. Tennyson D. Jarvis has resigned his position as Associate Professor of Entomology and Zoology. He is now living at Grimsby East and devoting himself to the cultivation of a fruit farm. In consequence of this change, the following appointments have been made: Mr. Lawson Caesar, Provincial Entomologist, promoted to be Associate Professor; Mr. A. W. Baker to be Lecturer, and Mr. G. J. Spencer to be Demonstrator. These gentlemen are all graduates of the College and have received the degree of B.S.A. from the University of Toronto. C. J. S. B.

FIELD NOTES AND QUESTIONS.

(Notes on rare or otherwise interesting captures, habits of insects, etc., will be gratefully received by the editor).

Heliomata infulata Grote. This pretty little Geometer is usually very rare here, perhaps only half-a-dozen specimens having been observed in twenty years, but one day at the end of May 1913, while collecting in a locust thicket I noticed several specimens flying and managed to secure two. A heavy shower came up, compelling me to seek shelter, but after the rain I returned to the spot and captured 20 specimens inside two hours. A few days later I again visited the spot and was likewise disturbed by rain but this proved advantageous as the moth which generally is very shy and swift on the wing, appeared quite sluggish and easy of capture. Eighty specimens were taken in all in a space of about 7 acres. In the surrounding district of 100 acres of apparently the same conditions only a stray specimen or two could be discovered.

Fred Marloff, Oak Station P.O., Allegheny Co., Pa.

How Lepidoptera Winter. We are not infrequently asked in what stage butterflies and moths pass the winter months? It is not an altogether satisfactory answer to say that every one of the four stages is represented, as the enquirer is sure there *must be* some rule and the others be exceptions. In Newman's "Text Book of British Butterflies and Moths" 1913, there are 117 pages devoted to a list of species, giving collecting notes in tabular form and it may be of interest to know how the British species, including the micros figure out, as doubtless in the cooler parts of North America the proportion will be about the same. Counted roughly and omitting species of doubtful occurrence, out of 68 Butterflies, 9 winter as eggs; 38 winter as larvæ; 12 winter as pupæ; 9 winter as imagoes; of 781 moths, 108 winter as eggs: 306 winter as larvæ; 330 winter as pupæ; 37 winter as imagoes; so that about 80% winter either as larvæ or pupæ, almost exactly half of each; 15% as eggs and 5% as imagoes.

A. F. Winn, Westmount, Que.

Sphingidæ at Sugar. While collecting on St. Therese Island, on the Richelieu River, from July 16th to 19th last, several species of hawk moths visited the sugared patches, not resting, but hovering as they do over flowers. Those taken proved to be 6 *Sphinx kalmiæ*, 1 *Ampelophaga chœrilus*, 2 *Ceratomia amyntor.*

W. Chagnon, St. Johns, Que.

Notes on the Eggs of Macronoctua onusta Grote.

A female of this moth was picked up from a window sill in the business part of Montreal on September 22nd, and boxed for eggs after being fed on sugar and water. Next morning a little cluster of greenish eggs was on one side of the box but evidently the moth did not like the conditions as she was wandering about, poking her extended ovipositor into all parts of the box and the 11 eggs laid were not deposited in an orderly manner, some being flat, some on their edges others on top of one another.

The moth was transferred to a breeding cage with a supply of leaves of Iris germanica from the garden, and at once began climbing up and down the leaves. She soon selected a leaf with a long crack at the base. Into this crack an egg was placed and others were laid alongside of it in a row, the moth remaining in one position merely moving her body. Other eggs were laid during the day between the edges of the leaves where they overlap and this is probably where most are placed in nature to pass the winter.

When laid the egg is pale greenish but in a few days turns purplish. It is very much flattened on top and bottom and may be likened in shape to a vest button. The width is .6mm. and height .27mm., rounded at the edges. The ribs are shallow and show most on the sides. Hatched May 27-29.

Mr. Henry Bird tells me the larvæ will feed on *Gemmingia chinensis* as well as on the various species of Iris.

A. F. Winn, Westmount, Que.

SCUTIGERA FORCEPS IN ONTARIO.

In the June number of the "Canadian Entomologist" I notice that Dr. Gordon Hewitt has recorded an occurrence of *Scutigera forcæps* in Canada. During the past four or five years I have received several specimens of this Centipede taken in Ontario for indentification; two of these taken in Toronto I still have. It is probable that this myriapod is more common than is supposed, for if found by housekeepers it is more likely to be immediately smashed than brought for the attention of naturalists.

C. W. Nash, Provincial Biologist, Toronto.

Bombycia improvisa and *tearlii* Hy. Edw. A correction.

On page 184 of the May number appears a note by Mr. Cockle, which calls for "a correction of a correction." He states that Holland is in error in referring *tearlii* as a synonym of *improvisa*. So far that is correct, but the specimen figured by him on Plate XL, fig. 27 as *tearlii* is neither that species nor *improvisa*, but has been described by Barnes and McDunnough as *fasciata*, (Journ. N. Y. Ent. Soc., XVIII, p. 160, Sept. 1910). Those authors figure both Henry Edwards' species in their "Contributions", Vol. I, No. 4, Plate XII, ff. 4 and 19, and the female type of *fasciata* is shown in fig. 5 of the same plate. *Improvisa* and *fasciata* occur together on Vancouver Island, whence *fasciata* was described. *Tearlii* occurs in Alberta. I should prefer that the above correction were made by others, but proffer this as an alternative.

F. H. Wolley Dod, Midnapore, Alta.

BOOK REVIEWS.

The Entomologist's Monthly Magazine. We beg to offer our our hearty congratulations to the editors of "The Entomologist's Monthly Magazine", (London, England), on the completion of the fiftieth year of its publication. The first number was issued on June 1st, 1864 under the editorial direction of Messrs. H. T. Stainton, R. McLachlan, E. C. Rye, Rev. T.

Blackburn and Dr. H. Guard Knaggs—five of the most distinguished entomologists of the day. The present writer had the good fortune to be in England that year and made the acquaintance of the two first named, and subsequently corresponded with Dr. Knaggs, the author of "The Lepidopterists' Guide" of which three editions have been published. Mr. Stainton, editor of the "Entomologists' Annual" and author of an admirable manual on the "British Butterflies and Moths" and various works on the Tineina, extended the hospitality of his house at Lewisham to entomologists during one evening in the week, everyone being made welcome and given the opportunity of consulting his extensive collections and valuable library. These gatherings led to the formation of many warm friendships and brought isolated workers into touch with the leading devotees of the science.

As time went on the pioneers of the Magazine one by one passed away and their places were filled by others equally able and distinguished, so that the publication has never failed to maintain its early reputation and attractiveness, and we may confidently hope that it will continue for another half century to record the observations and investigations of the insect world for generations to come.

The jubilee number is made especially interesting by the record of its editorial management during fifty years and the portraits of the eight founders and editors. C. J. S. B.

New South American Scientific Journal. Prof. Charles E. Porter, occupying the chair of general zoology and applied entomology and also director of the recently established Museum and Laboratory of Economic Zoology at the National Agricultural Institute of Santiago, Chili, has undertaken the publication of a new scientific journal under the title "Anales de Zoologia Aplicada". This journal is to be especially devoted to original studies on species beneficial to and parasitic on man, domesticated animals and cultivated plants in America. The well-known "Revista Chilena de Historia Natural", edited by Prof.

Porter, is being continued, but only for systematic papers. The "Anales de Zoologia Aplicada" will be published quarterly, in 8⁰ on excellent paper, profusely illustrated with text figures and when necessary with plain or coloured plates. The "Anales de Zoologia Aplicada" will accept original contributions on American parasites (Protozoa, Vermes, Arthropoda), which may be in English, French or Spanish. Announcements of books, other scientific periodicals and instruments relating to the subject matter of the journal will be printed on coloured special pages. The director wishes to exchange the "Anales de Zoologia Aplicada" with all special journals of economic zoology and entomology. The subscription price is 25 Francs a year. Advertisements on coloured pages 25 fr. per page for each number. The address of the director of the new journal is:

Prof. C. E. Porter, C.M.Z.S., F.E.S., Casilla 2974, Santiago, Chili.

The enterprise should have all the encouragement possible.

FREDERICK KNAB.

OBITUARY

EDWIN FIRMSTONE HEATH

We regret to record the death of Mr. E. Firmstone Heath, of the Hermitage, Cartwright, Man. For some time he had been ill, but not until the early days of April was he confined to his bed. When medical aid was summoned it was found that his heart was in a very critical condition, and this was accompanied by congestion of the lungs. After five weeks of intense suffering he died on May 14th, 1914.

Mr. Heath was born at Standhill, Kingswinford, County of Stafford, England, on August 9th, 1840. He was the eldest son of the late Edwin Heath of the 88th Regiment (Connought Rangers). He inherited a love for entomology from his father, and at an early age began to form a collection of insects. For the last 25 years he studied the insects of Manitoba, more particularly the Lepidoptera. He was a most enthusiastic collector, and brought together a representative collection of the Lepidoptera of that province. The late J. B. Smith corresponded regularly with him

and determined many of his specimens of Noctuidæ. Many of these collected at Cartwright, Man., were described as new species by Dr. Smith. For many years Mr. Heath was a valued correspondent of the late Dr. James Fletcher, and it was through Dr. Fletcher that the writer became acquainted with him. I have been in constant communication with Mr. Heath, particularly with regard to important captures, records of which have been included in the "Entomological Record", published annually in the Report of the Entomological Society of Ontario. Like other Canadian entomologists, I have always found him a most enthusiastic collector and an exceedingly interesting correspondent. I shall indeed miss his friendly and helpful letters.

Mr. Heath was a regular contributor to this journal, his papers being chiefly records of Lepidoptera occuring at Cartwright. Many of these were new records for the province.

The last article he published appeared in the April, 1914, issue of the Canadian Entomologist, and was entitled, "A Phalangid Drinks Milk". A. G.

The following note was received from the late Mr. E. F. Heath about a year ago, but by an oversight its publication has been unduly delayed.

THE EDITOR OF THE CANADIAN ENTOMOLOGIST,
Dear Sir:

On the night of the 8th inst. (1912), I captured at my "sugared" trees a specimen of *Thysania zenobia* Cram. in very good condition. I can only account for its appearance on the supposition that it must have come north, in the pupal stage, in a bunch of bananas, or by some such means. That I should get it is the more extraordinary for I lie between three villages, the nearest being four miles distant, and the other two, six and seven miles respectively.

Yours faithfully,
E. FIRMSTONE HEATH.

The Hermitage, near Cartwright, Man.

Mailed August 14th, 1914.

The Canadian Entomologist.

Vol. XLVI. LONDON, SEPTEMBER, 1914 No. 9

NOTES ON MYRIAPODS FROM DOUGLAS LAKE, MICHIGAN.

BY RALPH V. CHAMBERLIN, CAMBRIDGE, MASS.

The Chilopods and Diplopods here listed and described were all collected near the University of Michigan Biological Station at Lake Douglas, Mich., during July and August, 1913, by Mr. G. F. Sutherland, by whom they were sent to the writer for identification. All the specimens were taken from decaying logs.

The new Nampabius is represented by numerous individuals of both sexes. It is the largest known species of the genus and is geographically the most remote from what seems to be the centre for the group. Its habits would seem to correspond with those which I have noted for various other species in the genus, these having similarly been taken in greatest abundance under the bark of decaying logs.

Judging from the number of individuals in the collection, the new Parajulus is much the most common species of the genus occurring in the decaying logs at Douglas Lake. It is a strongly marked species, easily distinguishable from others known to occur in the region.

Class CHILOPODA.

1. **Geophilus rubens** Say.

This widespread species, at once distinguishable from others of the region by the characteristic geminate black stripe along dorsum, is represented in the collection by numerous specimens.

2. **Linotænia chionophila** (Wood).

Also a very common and widespread species in the Northern United States and in Canada. In the collection are three adults and three very young specimens.

3. **Bothiopolys multidentatus** (Newport).

A species common throughout the Middle Western and the Eastern States. Many specimens.

4. **Nadabius iowensis** (Meinert).

A species very common in the Middle West. About a dozen specimens.

5. **Sonibius bius** (Chamberlin).

Previously known from Saunders in the upper peninsula. Two specimens.

6. **Nampabius michiganensis**, sp. nov.

Dorsum from light brownish yellow to brown of dilute chestnut caste, the caudal plates commonly darkest. Head darker, more distinctly chestnut. Antennæ like head; the colour becoming denser and more reddish distad. Prosternum and prehensors somewhat lighter than head, but decidedly darker than venter, which is yellow or brownish yellow and darker caudad or usual. Caudal legs darkest.

Body conspicuously narrowed cephalad from eighth plate. Widths of head and of first, third eighth, tenth and twelfth plates to each other as 47: 41: 45: 56: 55+; 54.

Head slightly wider than long (47:45) comparatively rather wide cephalad. Caudal margin mesally incurved. Two short longitudinal furrows on caudal portion, these moderately diverging cephalad.

Antennæ short, but somewhat longer than in most related species. Uniformly and considerably attenuated distad, the terminal portion slender. Articles freely joined; sides straight; short, decreasing regularly from the second distad. Ultimate article distinctly shorter than the two preceding together.

Ocelli mostly 10 to 12 in 3, or, less commonly, in 4 series; e.g., 1+4, 4, 2; 1+4, 4, 3; 1+1, 4, 3, 2, the ocellus of the top row in this case being at anterior end of patch. Single ocellus much largest, the others decreasing regularly and considerably cephalad. Organ of Törnösvary in outline small; below anterior end of eye patch.

Prosternal teeth acute, subequal, sides straight, the interval well rounded; line of apices recurved. Sinus wide at bottom as usual; its sides rather long, moderately converging. Sides of anterior portion of prosternum straight or nearly so, slanting directly from spine, 1.47 times wider than long in type. Distance between chitinous spots 2.57 times width at level of bottom of sinus, 4 times the dental line.

First dorsal plate in type 1.64 times wider than long. Eleventh and thirteenth plates, but especially the latter, with posterior angles very slightly produced as usual.

Coxal pores mostly 2, 3, 3, 2; 2, 3, 3, 3 or 3, 3, 3, 3.

Spines of the anal legs, $\frac{0,0,2,0,0}{0,1,1,1,0}$, claws 2; of the penult, $\frac{0,0,2,0,0}{0,1,1,1,0}$, claws 2; of the thirteenth, $\frac{0,0,2,1,0}{0,0,1,1,1}$; of the twelfth, $\frac{0,0,2,1,1}{0,0,0,1,1}$ or $\frac{0,0,2,1,1}{0,0,1,1,1}$; of the sixth to eleventh, $\frac{0,0,0,2,1}{0,0,0,1,1}$; of the third to fifth, $\frac{0,0,0,1,1}{0,0,0,1,1}$; of the second, $\frac{0,0,0,0,1}{0,0,0,0,1}$: of the first, $\frac{0,0,0,0,0}{0,0,0,0,0}$.

Claw of the female gonopods of the usual tripartite form, the teeth acute, the median longest and the lateral subequal. Basal spines decidedly broader than usual, much as in *Tidabius*, those of each pair close together; moderately long. Outer spine longer and broader than the inner; its sides subparallel from base to apical division, which is short and acute. or weakly incurved at middle; edge of apical portion usually finely crenulate. Inner spine of similar shape to that of the outer or with sides sometimes converging from base to apical portion.

Length 7—10 mm.

This species is very distinct from any previously known. It is aberrant in a number of features, such as the large single ocellus and the broad basal spines of the female gonopods. It is the largest known species, and the one farthest from what seems to be the centre of distribution for the genus. The process on the penult legs of the male is much like that of *virginiensis;* but *michiganensis* differs clearly from that species in its much greater length, which is about twice that of *virginiensis*, in the spining of the legs, and in the form of the basal spines of the female gonopods. *N. fungifuopes*, the species that has been taken geographically nearest to it (Western New York), is readily separable from it, as from all others now known, in lacking dorsal spines on the posterior legs; also the form of the process on the penult legs of the male is distinctly different.

Many specimens of this species were taken.

Class DIPLOPODA.

7. Polyzonium rosalbum (Cope).

One specimen.

8. **Spirobolus marginatus** (Say).

One adult and one immature specimen. A widespread form.

9. **Parajulus venustus** (Wood).

A form common in the region. Three specimens.

10. **Parajulus canadensis** (Newport).

A species common in the North-Eastern States and Canada. Six specimens.

11. **Parajulus**, sp. Jr.

Two very young specimens of uncertain species.

12. **Parajulus dux**, sp. nov.

General colour brown, often very light. A distinct longitudinal median dorsal black line which is commonly interrupted. The usual series of black spots over the repugnatorial glands, but each spot embracing one or more light areas, and so often inconspicuous. A dark transverse line across dorsum and connecting the two lateral spots of each segment. Also below the spots a dark line or band is more or less developed; this band is areolated with light spots and is often inconspicuous or scarcely evident. A broad black band across anterior border of first plate, anal scutum often blackish. Eyes black. Antennæ dusky brown to black, the distal article commonly pale. A solid black band between antennæ with a light spot in each end near antennæ. Vertex marked with close network of coarse dark lines. Lower part of head dusky, more or less areolated with light dots, a larger light area below each antennæ and along labial margin, above which and ectad of lateral light areas there is commonly a dark band.

Sulcus of vertex fine, ending near upper level of eyes. A deep setigerous foveola on each side of anterior end of the sulcus, the female sometimes more or less extended laterad.

Eyes large, subtriangular, but the sides convex. Ocelli mostly between 42 and 52 in 7 to 9 transverse series, e.g.:

7, 7, 7, 6, 6, 5, 3, 1; 9, 9, 8, 7, 6, 5, 3, 1.

First dorsal plate with lateral border rounded, not at all angularly produced. Distinctly but not strongly margined. Two striæ across lateral ends and a number of less deep short ones above these across caudal border.

Second segment deeply striate ventrally and over lower portion of sides, the striæ well separated above, but closer together

ventrally. Succeeding segments also similarly deeply striate, the striæ coarse and well separated above, nearer together ventrally, not occurring above level of dark repugnatorial areas.

Repugnatorial pore small, in most segments a considerable distance removed from the suture, which at its level is straight or only slightly and broadly excurved.

Anal tergite with tip acute and spinous, clearly exceeding the valves, distally weakly and evenly decurved, but by no means so strongly or angularly as in *canadensis*.

Anal valves not mesally distinctly margined, at most broadly somewhat raised, the border crossed by transverse striæ.

Anal scale with caudal margin widely convex; mesally slightly indented.

Mandibular stipes in male concavely excavated; produced caudad below the excavation.

Promentum of gnathochilarium in male much enlarged as usual; elliptic in outline.

First legs in male strongly enlarged as usual; uncinate; penult article conspicuously crassate proximally, though less so than preceding article, and narrowing much distad, its inner side nearly straight.

Second legs of male with coxæ much enlarged and produced mesally into a long linguiform process, which is broadest proximally and narrows distad, though widening a little at very end, which is truncate. Legs reduced as usual.

Anterior division of first gonopods of male broad, clavate, distally rounded, in lateral view concealing wholly, or nearly so, the caudal division, which is somewhat shorter than the anterior and narrows strongly distad except at tip, where it enlarges again a little and is distally subtruncate.

Posterior gonopods in ventral view almost concealed by the first, above which they do not rise. Each curves mesad near level of distal end of first gonopods and then proximad. A semi-membranous pointed blade-like branch arising from base and a little surpassing posterior branch of first gonopods.

Number of segments 44, or near that number.

Length: 25—32 mm.

In the general superficial appearance of the gonopods this species resembles *P. canadensis;* but the posterior division of the

first gonopods is shorter and is distally truncate, while the second gonopods are more decidedly different. *Canadensis* is a darker species which may be at once distinguished in both sexes from the present one by the much longer and more strongly and abruptly decurved spinous tip to the anal scutum. The wide separation of the small repugnatorial pore from the suture is a characteristic of importance.

This species is represented in the collection by numerous specimens.

13. **Polydesmus serratus** Say.

Polydesmus canadensis Newport.

This common Polydesmus is represented by numerous specimens.

14. **Branneria carinatum** Bollman.

Two specimens; the first to be added to the few specimens in the collection of the author of the species.

SOME NOTES ON PARASITISM OF CHRYSOPIDS IN SOUTH CAROLINA.

BY E. A. McGREGOR,
Bureau of Entomology, Washington, D. C.

In 1890 Dr. Howard published notes on "The Parasites of the Hemerobiinæ."* In this article the author records *Telenomus* sp. as an egg parasite of "either *Chrysopa* or *Hemerobius*." As secondary parasites reared from larvæ or cocoons, † he mentions *Hemiteles hemerobiicola* Ashm., *H. rufiventris* Riley and *Mesochorus (?) chrysopæ* Ashm. At that time Doctor Howard prophesied that several species of the proctotrupid *Helorus* would eventually be found to be primary parasites of Chrysopids. This prediction has been substantiated by the present writer's work. Moreover, the two rearings of *Isodromus iceryæ* at Batesburg, as indicated in Table II, add additional proof to Dr. Howard's

*Proc. Ent. Soc. of Wash., Vol. II, pp. 123-124.

†Since first preparing this paper on Chrysopid parasites, all of which had been bred from cocoons, we have been able to conduct some observations on Chrysopid eggs. In all 93 eggs were collected, and from these were bred 7 parasites—all of the species *Telenomus chrysopae* Ashm. Computed on the basis of 7 parasitized eggs out of 93, an estimated egg parasitism of 7.5% is found to obtain. The total parasitism, then, from species issuing from the egg (7.5%), and from species issuing from the cocoon (48.4%, is computed to be about 55.9%.

belief that the species was erroneously described as a parasite of *Icerya purchasi* and is in reality a true parasite of Chrysopids.

Certain studies of red-spider predators were conducted at Batesburg, South Carolina, during the season of 1913, and it was noticed that a considerable percentage of the Chrysopas were parasitized. In order to determine the approximate percentage of parasitism of these very beneficial insects Mr. F. L. McDonough, of the Bureau of Entomology, and the writer, collected a large series of cocoons from cotton plants growing in the fields. Adults from these cocoons were reared in the laboratory under conditions as nearly normal as possible.

Fig.26—Apical portion of cotton plant, showing the characteristic location of Chrysopid cocoon at C.

It is worth recording, since we have never noticed it in print, that the Chrysopas in cotton fields pupate very characteristically in the apical buds at the very terminal portion of the stalk. The pubescence of the nascent foliage at this point is densely concentrated and of a grayish appearance, thus approximating the texture of the cocoon and affording considerable protection for it. This is shown in the accompanying figure. Of course, occasional cocoons are found in other locations, as, for example, within the involucral bracts of "squares" or in the convolutions of leaves. These are exceptions.

All of the several lots of Chrysopid cocoons collected were observed daily until they either produced adults or parasites, or until they clearly indicated that they were not going to give issue to anything. The final summary of results from this detailed study—in the case of the largest lot—is shown in Table 1.

TABLE I.—Estimated Parasitism of Chrysopids.

Chrysopid cocoons observed	99
Cocoons yielding Chrysopids	51
Cocoons yielding parasites	48
Percentage of parasitism	48.4%

A lot of about 100 bred Chrysopids were determined by Mr.

Nathan Banks, and it developed that there were three species present: *Chrysopa rufilabris* Banks, *C. nigricornis* Burm., and *C. oculata* Say. The great majority of the specimens were *rufilabris*, while but a few individuals of *oculata* and *nigricornis* were present. The superficial appearance of the three species is much alike, and undoubtedly the habits and life histories are likewise in the main the same.

Mr. J. C. Crawford, who has kindly determined the parasite material, states that the collection, which embraces several hundred specimens, is the most extensive that has been obtained from lace-winged flies. He has also determined that three of the species are new to science, and that their descriptions are now in the course of preparation by him. The following table lists the species in the relative order of abundance and indicates the maximum and average number of individuals issuing from a Chrysopa cocoon in the case of each species.

TABLE II.—Relative Abundance of Parasites.

Number of lots.	SPECIES.	Maximum No. per lot.	Average No. per lot.
20	Chrysophagus compressicornis Ashm	20	10
15	Perilampus sp.....	1	1
10	Goniocerus sp.....	18	9
2	Isodromus iceryae M.....	3	3
2	Orthizema atriceps Ashm. (1).....	1	1
1	Heiorus sp	1	1

(1) Ichneumonid determined by R. A. Cushman.

It is of interest in this connection to record that *Chrysophagus compressicornus*, in addition to being reared frequently from Chrysopids, was reared upon one occasion from an undetermined *Syrphid* pupa. Likewise, from this same *Syrphid* species, were reared the Chalcidoid flies—*Pachyneuron allograptæ* Ashm., and *Syrphophagus mesograptæ* Ashm.

A REVIEW OF THE WORK ON THE POISONED BAIT SPRAY, DRY METHOD AND MIXED TREATMENT OF CONTROLLING FRUIT FLIES (TRYPETIDÆ).

BY HENRY H. P. SEVERIN, PH. D., MILWAUKEE, WIS.

(Continued from p. 284).

Mixed Treatment.

The mixed treatment is a combination of the spray and a dry method of control. The object of this method is to reduce the number of applications of the spray. One sac was placed in every fifth tree. Two applications of the spray were made during the entire season. The following formula was used:

Molasses.....100 kilogr.
Sodium arsenate..... 2 „

This stock solution was diluted by adding 100 liters of water to 15-20 kilogrammes of the poisoned molasses. About 1 pint of this solution was applied to a tree. The cost of the mixed treatment amounted to $2.00 per tree. This method was carried on during three successive seasons and the results are recorded in table VIII.

TABLE VIII.

	Number of trees.	Olives infested in treated orchard.		Olives infested in untreated orchard.	
		%	%	%	%
1909	550	2.5	2.0	45.0	69.0
1909	140	60.66		97.34	
1910	1200	22.85	22.29	86.8	62.0
1910	140	20.4		48.7	
1911	400	57.5		81.5	90.0

The difference in favour of the mixed treatment is apparent, but not satisfactory in all cases. The authors state that the poisoned bait is not so effective in olive gardens containing cultivated shrubs or where the olive grove is near a wood, for the olive fly probably secures shelter and nourishment from the nectar of flowers and sweetened exudation of herbaceous organs. On the other hand, in localities where the orchard is isolated and contains only olive trees, the fly is content with its shelter and seeks nourishment here, and the poisoned bait then produces its maximum effect.

Table VIII shows the effect produced by omitting the treatment for one year. In 1909, from 2 to 2.5% of the olives were maggoty from 550 trees which had received the mixed treatment. In 1910, the same 550 trees which are now included in the 1,200

trees again received the mixed treatment, and from 22.29 to 22.85% of the olives were infested. In 1911, the 550 trees were used as a check or control and 81.5% were infested.

Mexican Fruit Fly (*Anastrepha ludens* Loew).

While working on the control of the Mexican or Morelos orange worm, Betanzos (1) discovered the usefulness of a common poisonous Mexican herb (*Haplophyton cimicidum*). A decoction was made by boiling about two pounds of the herb cut fine in 3 gallons of water. After the herb was thoroughly boiled, about 2 pounds of sugar was added, and the whole was then strained and used as a spray. Rangel (1) obtained very satisfactory results from the use of this preparation in combatting the Mexican fruit fly.

Apple Maggot (*Rhagoletis pomonella* Walsh).

O'Kane (16) used a mixture of arsenic, molasses and water to control the apple maggot in New Hampshire. He writes: "Through the co-operation of growers this plan of spraying was tried at several different points. In most the results were negative. It seems probable that in these instances the possible value of the treatment was obscured by the proximity of other infested trees not so treated. Also owing to the pressure of other work the grower was unable to apply the spray as often as would be needed in order to keep the poisoned sweet ready for the flies throughout their egg-laying season. In one instance, however, the treated tree stood alone, and this tree was given repeated sprayings as primarily planned. The variety was August Sweet, and the fruit had been worthless for years. This tree yielded this season practically perfect fruit.

"There is sufficient reason, therefore, for making further tests of this treatment next season. To this end certain trees or blocks of trees have been selected, and the proper conditions provided to insure definite tests next season."

In 1911 experiments were conducted at the Maine Agricultural Experiment Station to control the apple maggot. Johannsen and Patch (8) write: "Our own experiments made this season upon two Talman sweet apple trees, using a spray of arsenate of lead and brown sugar in solution, gave discouraging results."

In 1912, Illingworth (6) published his results obtained with

the poisoned bait spray to control the apple maggot in New York. In 1911, he used the following "fly destroyer" as given by Merck to control the apple maggot.

	Parts.
Syrup	4 or 4 pts.
Potassium arsenate	1 or 1 lb.
Water	45 or 45 pts.

Two applications of the bait were made on July 22 and 26, about a pint being sprayed to the lower branches of a 20-year-old apple tree. In a table the author gives a daily record of windfalls from a treated tree and the number of larvæ which bored out of the fallen fruit. All the windfalls collected under the baited tree after August 15 to the end of the season were absolutely free from larvæ. From an untreated tree of the same variety in another orchard, 180 drops were gathered on August 23; from these apples larvæ emerged during September, while 115 drops of the same date from the treated tree failed to show a trace of a single maggot. The author concludes, "Hence it is quite evident that the flies deposited no eggs in the fruit of the sprayed tree after the application of July 26."

In 1912, Illingworth used the following formula:

Molasses	1 lb. or 25 lb.
Arsenate of lead	3 oz. or 5 lb.
Water	4 gall. or 100 gall.

Five applications of the spray were made. The author states, "In the spraying experiments during 1912 most gratifying results were obtained." No mention is made of the number of trees treated and no data are given as to the per cent. of fruit infested of the treated and control trees.

The author's observations indicate that the codling-moth spray of arsenate of lead alone may control the apple maggot if applied thoroughly to the fruit.

Ross (17) tested two spray mixtures, one composed of arsenate of lead, glycerine and molasses, and the other Paris green, glycerine and molasses, but neither yielded satisfactory results in the control of the apple maggot in Ontario.

Cherry Fruit Flies (*Rhagoletis cingulata* Loew. and *Rhagoletis fausta* O. S.).

In the season of 1912 Illingworth (7) adopted similar control measures against the cherry fruit flies. The orchard was four

rows wide and sixteen long, and had never been sprayed before. For several years the cherries in this orchard had been badly infested, and the previous year the fruit was not picked at all, due to the serious infestation of the pest. The following formula was used:

Molasses	1 pt.	or	3 gall.
Arsenate of lead	3 oz.	or	5 lb.
Water	4 gall.	or	100 gall.

Two applications of the bait were made on June 10 and 24. Eleven rows were sprayed and five rows were used as a check. The fruit of the unsprayed trees showed an infestation of fully one-third of the crop, while only one-sixth of 1% was wormy on the treated trees. The sprayed fruit showed also a noticeable lack of brown-rot and of curculio injury.

As in the case of the apple maggot, there is some evidence that arsenate of lead alone, without sweeting, may prove effective against the cherry fruit flies. "Fruit free from the pest resulted in one orchard from merely making two applications of the codling-moth strength (4–100) during the period when the flies were emerging. Although this experiment is not very conclusive, since no checks were left, it indicates clearly the value of spraying cherries."

Currant or Gooseberry Fruit Fly (*Epochra canadensis* Loew).

Lovett (10) attempted to control the currant or gooseberry fruit fly with Mally's formula (Table I, 1908) of the poisoned bait spray. No conclusive results were obtained, but the following brief summary of the season's trials is given:

1. The sweetened poison does attract the fly.

2. Frequent rains during the period of experimentation made numerous applications necessary.

3. "Granulated sugar is rather expensive; it crystallizes quickly and is not so satisfactory as a cheaper brown sugar would probably be."

4. "The crop was injured one half in many localities, and in a few cases the fruit, due to the maggot's attack, was not worth gathering."

Imported Onion Fly (*Pegomya cepetorum* Meade).

We have experimented with the poisoned bait spray to control the imported onion fly under Wisconsin conditions. Sodium

arsenite was used instead of arsenate of lead. Different quantities of a number of brands of arsenate of lead were used, but many onion flies were still alive at the end of a week, even though the bait was renewed daily. The following formula was used:

Molasses	¼ pt.	
Sodium arsenite	¼ oz.	(dissolved in boiling water).
Water	1 gall.	

The results obtained against the second brood of the pest were most encouraging in a somewhat isolated onion field. As the season's work was started too late to test the effectiveness of the poisoned bait against the first brood of the pest, which is probably more difficult to combat on account of the frequent spring rains which wash off the spray, no definite conclusions can be drawn from the good showing that the spray has made against the second brood.

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A NEW JULUS FROM CALIFORNIA.

BY RALPH V. CHAMBERLIN, CAMBRIDGE, MASS.

Specimens of the new Julus here described have been received for identification from Assistant Secretary Leroy Childs, of the California State Commission of Horticulture. Mr. Childs states that it is very common in the southern part of California and that it is reported as inflicting serious injury to tender vegetables, such as young lettuce. The writer has taken it near Santa Barbara. The types are from Los Angeles.

Julus hesperus, sp. nov.

This species has the size and, to some extent, the general appearance of *J. virgatus* Wood, though it is less slender and lacks the conspicuous median dorsal black line so characteristic of the latter species.

The paler individuals are brown, with the usual series of black spots along each side. Specimens in full colour have the

FIG. 27.—*Julus hesperus*, male, left leg of first pair, mesoventral view.

FIG. 28.—*Julus hesperus*, male, gonopods, cetal view.

background typically darker brown or obscure chestnut, with the sides dusky or black, excepting the head and several anterior segments, which are usually light brown, as the last several segments may also be; the wide dark lateral bands embracing the rows of spots leave between them a narrow median dorsal light stripe.

Head with sulcus across vertex sharply impressed, the sulcus terminating anteriorly in a broader, shallow transverse furrow on a level with the dorsal edges of the two eyes. Setigerous foveolæ not evident.

Antennæ slender, clavate, a little shorter than width of body.

Eyes distinct, subtriangular. Ocelli in types from 17 to 20 in 5 or less commonly 4 series, e.g., 5, 5, 5, 3, 2; 5, 5, 4, 3, 1.

First dorsal plate with lower caudal corner rounded or weakly obtusely angular on ventral side; striate below. Other segments striate above and below cephalad to suture; striæ distinct, moderately spaced. Repugnatorial pore circular; tangent to suture, which is not at all angulate.

Anal scutum obtusely angular, simple. Valves not at all or only very obscurely margined. Anal scale simple, with the caudal margin convex.

First legs in male small, strongly bent or hamate, as shown in the accompanying figure.

Gonopods of male concealed. The two pairs widely divergent; anterior ones moderately short; those of the posterior pair contiguous, bilobate. Flagellum very long (see figure 28).

Segments in types 35 to 41.

Length, 11—15 mm.

SYNOPSIS OF THE NORTH AMERICAN SPECIES OF THE GENUS *CAPITONIUS* BRULLE.*

BY S. A. ROHWER, WASHINGTON, D. C.

The North American species which are here placed in the genus *Capitonius* have been referred to a number of genera, as may be seen from the bibliography of the species which follows.

Szepligeti (Gen. Insectorum, Braconidæ) states that all our species belong to the genus *Cenocoelius* Westwood. According to the type species, as indicated by Viereck, Bull. 83, U. S. Nat. Mus., *Cenocoelius* Westwood is founded on *flavifrons*, which is not yet characterized, but *Cœnocoelius* Marshall is synonymous with *Capitonius*. *Capitonius* having priority is used for our species. It may be possible by comparison with the type of *Capitonius* to differentiate the North American species into a different generic group, if certain Neotropical species are typical *Capitonius* of the Neotropical region, but sufficient material is not available for such study. From the material and notes available it is evident that the species of the genus *Capitonius* are parasitic on wood or bark boring Coleoptera, and from the notes it seems that they are all internal parasites pupating after destroying the host within a cocoon in the larval gallery. The following host relations seem to be thoroughly established for the North American species:

Liopus alpha and *Liopus fascicularis* in sumach—Parasitized by *Capitonius ashmeadii* and *Capitonius provancheri*.

Leptostylus (either *macula* or *collaris*) in chestnut—Parasitized by *Capitonius leptostyli*.

Lepturgus facetus in chestnut—Parasitized by *Capitonius provancheri*.

Goes oculata in *Oxydendrum arboreum*—Parasitized by *Capitonius nigrisoma*.

Micrasis in hickory—Parasitized by *Capitonius provancheri*.

Synoxylon in hickory—Probably parasitized by *Capitonius caryæ*.

Saperda candida in elm—Parasitized by *Capitonius saperdæ*.

*Contribution from the Branch of Forest Insects, Bureau of Entomology, U. S. Department of Agriculture, Washington, D. C.

September, 1914

Table to the Species.

Abdomen rufous; head and thorax black.....1.
Abdomen and thorax black.....4.
1. First tergite smooth, the embossed area only indicated basally .....*erythrogastra* Rohwer.
First tergite more or less striate and with a rather well-defined embossed area.....2.
2. Embossed area of the first tergite not well defined; the striæ on the first tergite not extending beyond the middle.....*caryæ* Rohwer.
Embossed area of the first tergite defined by strong carinæ, which extend beyond the middle of the tergite.....3.
3. Notauli not foveolate.....*sanguiniventris* Ashmead.
Notauli strongly foveolate.....*saperdæ* Ashmead.
4. First tergite entirely without sculpture.....5.
First tergite usually strongly sculptured and always with some sculpture at the base.....6.
5. Legs uniformly pale testaceous; median depression of the anterior portion of the prescutum well defined, but without defining lateral carinæ.....*leptostyli* Rohwer.
Legs black or piceous; the median depression on the prescutum broader and shallow and with well-defined lateral carinæ.....*nigrisoma* Rohwer.
6. Prescutum sculptured like the scutum; first tergite with strong carinæ basally, without other sculpture..*tenuicornis* Rohwer.
Prescutum more closely sculptured than the scutum; first tergite not so.....7.
7. First tergite with strong carinæ, which reach the apex of the segment, but with no predominating median rugæ.....*ashmeadii* (D. T.)
First tergite with the striæ laterally which never reach the apex of the segment and with a predominating median stria or shining median area separating off a subembossed area.....*provancheri* Rohwer.

Capitonius erythrogastra, new species.

Female.—Length 5 mm. Head broad as the thorax; posterior orbits broad; median portion below the antennæ with distinct

punctures which are separated by about twice the width of a puncture; the clypeus, the sides, the front and occiput shining, impunctate or with very sparse, separated punctures; third antennal joint but little longer than the fourth; mesonotum shining, practically impunctate; notauli strongly foveolate; the suture between the scutum and scutellum with three strong rugæ; propodeum strongly reticulate, the dorsal surface with two narrow, transverse impressions; first tergite without sculpture. Black; head and thorax densely clothed with long white hair; legs rufous, the bases of the four anterior femora and the posterior tibiæ piceous; abdomen rufous; wings dusky hyaline, venation black.

Morgantown, West Virginia. Described from two females (one type) collected by A. D. Hopkins, and recorded under W. Va. Agricultural Experiment Station Number Hopk. W. Va. 7790*b*, and from one female (paratype) from Tryon, North Carolina, collected by W. F. Fiske, and recorded under Bureau of Entomology Number Hopk. U. S. 1645*c*.

Type.—Cat. No. 18277, U. S. N. M.

Capitonius caryæ, new species.

Female.—Length 5.5 mm. Closely allied to *erythrogastra*, but may be distinguished from that species by the characters in the foregoing table, in having the propodeum rufous, the legs black except the rufous hind femora.

Tryon, North Carolina. Described from two females recorded under Bureau of Entomology Number Hopk. U. S. 3654j, which refers to a note stating that this species is probably parasitic on *Synoxylon* in hickory, material collected and reared by W. F. Fiske.

Type.—Cat. No. 18278, U. S. N. M.

Capitonius sanguiniventris (Ashmead).

Promachus sanguiniventris Ashmead—Proc. U. S. Nat. Mus., 1888, Vol. II, p. 653.

Capitonius saperdæ (Ashmead).

Promachus saperdæ Ashmead—Proc. U. S. Nat. Mus., 1888, Vol. II, p. 652. (A brief reference with a negative description.)

Promachus saperdæ Riley manuscript.
Riley—Ins. Life, Vol. III, 1890, p. 59.
Bracon populator Say—Long's Exped. to St. Peter's River, Vol. II, 1824, p. 323. (The original description will apply to many species in a number of different subfamilies in the Braconidæ.)

This species may be differentiated from the other species of the group by the foregoing table; the propodeum may or may not be rufous; the legs are entirely rufous.

Type.—Cat. No. 18279, U. S. N. M.

Capitonius rugosus (Provancher).

Syngastre rugosus Provancher—Addit. Fauna Ent. Hym. Can., 1886, p. 122.
Capitonius rugosus Provancher—Addit. Faun. Hym. Can., 1888, p. 378.

From the original description this species belongs near *sanguiniventris* Ashmead and allies, but none of the species agree with the original description in having the second segment aciculate. If this is true of Provancher's species it is undoubtedly distinct.

Capitonius leptostyli, new species.

Male.—Length 4 mm. Head fully as wide as the widest portion of the thorax, uniformly sparsely punctured, the posterior orbits not as wide as the diameter of the eye; third antennal joint subequal in length with the fourth; prescutum with large, well-defined punctures; scutum polished, shining, with a few small widely-scattered punctures; notauli strongly foveolate; the suture between the scutum and scutellum with five strong rugæ; scutellum sculptured like the scutum; propodeum strongly reticulate without any transverse areas dorsally; abdomen shining without sculpture; the embossed area of the first tergite defined at the extreme base only. Black; head and thorax with long gray hair; palpi pale testaceous; scape and legs pale testaceous; wings hyaline, venation pale brown, costa and base of stigma light brown.

Tryon, North Carolina. Described from five males collected by W. F. Fiske, and recorded under Bureau of Entomology Num-

bers Hopk. U. S. 3072*o* (type), 3072*i*, 3028*b*, 1495*h*; also a paratype from Ballston (Veitch), Virginia, collected by T. E. Snyder, and recorded under Bureau of Entomology Number Hopk. U. S. 9688*o*[1]. The paratypes indicated with this species may have the head black, piceous or rufous. The notes for this species, made by W. F. Fiske, indicate that it is an internal parasite, which in the last stage becomes external, on *Leptostylus* in chestnut (either *Leptostylus macula* or *Leptostylus collaris*). The cocoons are made in the larval galleries of the host.

Type.—Cat. No. 18280, U. S. N. M.

Capitonius nigrisoma, new species.

Female.—Length 6 mm. Head as broad as the widest portion of the thorax; the posterior orbits narrower than the shortest diameter of the eye; head immediately below the antennæ with the punctures about a puncture width apart; remaining portion of the front with the punctures more widely separated; the posterior orbits and occiput with the punctures very widely separated; third antennal joint one-fifth longer than the fourth; prescutum shining with a few large, well-defined, separate punctures; notauli poorly foveolate; scutum with the punctures more widely separated than those of the prescutum; the suture between the scutum and scutellum with many strong rugæ; scutellum shining, impunctate; propodeum strongly reticulate; dorsal lateral part with reticulations tending to transverse areas bounded by carinæ; tergites shining, without sculpture. Black; head below the antennæ and thorax with long white hair; wings hyaline, venation dark brown.

Male.—Length 5 mm. Agrees well with the above description of the female, except in having the head rufo-piceous.

Tryon, North Carolina. Described from two females and one male, recorded under Bureau of Entomology Number Hopk. U. S. 3658*b* and *c* (type, allotype and paratype); paratypes under Hopk. U. S. 1552*f*. Material collected and reared by W. F. Fiske. The notes under 3658*b* state that specimens were reared from dead pine infested with Cerambycidæ and Buprestidæ. The notes under No. 1552*f* state that this species is a parasite on *Goes oculata* in hickory.

Type.—Cat. No. 18281, U. S. N. M.

Capitonius tenuicornis, new species.

Female.—Length 4 mm. Head hardly as wide as the width of the thorax at the tegulæ, posterior orbits narrower than the shortest diameter of the eye; face shining with a few widely-separated punctures; posterior orbit and occiput shining, impunctate; third antennal joint slightly longer than the fourth; prescutum and scutum similarly punctured; the notauli strongly foveolate; the suture between the scutum and the scutellum with ten longitudinal rugæ; scutellum sculptured like the scutum; propodeum reticulate, on the median basal dorsal portion one of the reticulations is larger and roughly diamond-shaped; first tergite with an embossed area on the basal third, which is defined laterally by strong carinæ, otherwise without carinæ or sculpture. Black; antennæ dark piceous; legs dark piceous, but becoming darker basally; head and thorax sparsely clothed with long gray hair; wings hyaline, venation pale brown.

Fort George, Florida. Described from one female from the Ashmead collection and with the Ashmeadian manuscript name, *tenuicornis.*

Type.—Cat. No. 18282, U. S. N. M.

Capitonius ashmeadii (Dalla Torre).

Promachus rubriceps Ashmead—Proc. U. S. Nat. Mus.,Vol.II, 1888, p. 653 (nec Ratzeburg or Provancher).

Cenocoelius ashmeadii Dalla Torre—Cat. Hym., Vol. V, 1898, p. 72.

Both males and females of this species are in the collections, and can be readily differentiated by the foregoing table. The species is a primary parasite of *Liopus alpha* and *fascicularis* in Sumach.

Capitonius provancheri, new name.

Capitonius rubriceps Provancher—Addit. Faun. Ent. Hym. Canad. 1886, p. 135 (nec Ratzeburg).

This species is closely allied to *ashmeadii,* but from the specimens available can be readily distinguished from that species by the characters in the foregoing table. It, as well as *ashmeadii,* varies in having the head rufous, rufo-piceous or black. Specimens

of this species have been reared as primary parasites on either *Neoclytus erythrocephalus* or *Agrilus egenus* in locust, by A. D. Hopkins in West Virginia, data recorded under W. Va. Experiment Station Number Hopk. W. Va. 6040*a*; have been reared from the pupal cells of *Liopus alpha* in sumach at Tryon, North Carolina, by W. F. Fiske, data recorded under Bureau of Entomology Number Hopk. U. S. 1514*c*; have been reared as an internal parasite of *Lepturgus facetus* in chestnut at Tryon, North Carolina, by W. F. Fiske, data recorded under Bureau of Entomology Number Hopk. U. S. 3012*a*; have been reared as a parasite on *Micrasis* in hickory at Tryon, North Carolina, by W. F. Fiske, data recorded under Bureau of Entomology Number Hopk. U. S. 3192*d*. It has also been reared as a parasite of *Liopus fasciculatis* in sumach by Dimmock.

THE DESTRUCTIVE INSECTS OF NEW JERSEY.

BY HARRY B. WEISS, NEW BRUNSWICK, N. J.

Considering the fact that there are 10,385 species of insects listed as occurring in New Jersey, it is surprising how small a proportion of this number is destructive enough to warrant the application of insecticides. The following list, compiled from Smith's "Insects of New Jersey," gives the number of species in each Order which occur in sufficient numbers to be considered destructive and against which measures of control must be directed at various times. It is to be remembered, of course, that there are numerous other species which are classed as injurious, but these do not occur in numbers large enough to make their presence felt, or they confine their attentions to unimportant plants and are therefore not included in the list.

	Number of species —listed	Number of species —destructive.	Percentage of species destructive.
Coleoptera	3092	50	1.6%
Lepidoptera	2120	58	2.7 "
Hymenoptera	1980	9	0.4 "
Diptera	1661	28	1.6 "
Hemiptera	504	8	1.5 "
Homoptera	479	28	5.8 "
Orthoptera	154	5	3.2 "

Of the entire number of species in New Jersey 10,385, which includes all Orders, only 1.7 per cent. is really destructive. Of the entire number of species in the above seven Orders, 1.8 per cent. is destructive. As to the individual Orders, Homoptera has

the largest percentage and Hymenoptera the smallest. This is not strange, considering the fact that all species of the Homoptera are plant-feeders, while the Hymenoptera consists of both beneficial and injurious forms, with the beneficial ones largely in the majority.

The Orthoptera, with its 3.2 per cent of destructive species, also contains a large majority which feed upon vegetation. While most Lepidopterous larvæ feed upon foliage, yet the fact that many feed upon plants and trees not under cultivation by man, or occur in small numbers, brings the percentage down to 2.7.

The Hemiptera are plant feeders, with numerous exceptions; predatory and injurious forms are abundant in the Coleoptera, while the Diptera contains predacious and beneficial species and feeders upon animal and vegetable tissues. In these three Orders the percentages of destructive species are nearly the same.

While the number of species affecting one kind of plant is often large—for instance, Folsom gives 200 attacking Indian corn, 400 the apple, and the oaks 1,000—yet it may be safely said that the insect losses in the State of New Jersey, running as they do well into the millions, are due to the pernicious activities of 186 species, some of which are and any one of which may become notably abundant.

SYNONYMICAL NOTES ON NORTH AMERICAN SCIOMYZIDÆ.

J. R. MALLOCH, URBANA, ILLINOIS.*

Sepedon macropus Walker

This species is identical with *S. nigriventris* v. d. Wulp, so that the latter name must be dropped as a synonym. I have examined a number of specimens from Brownsville, Texas, and Tampico, Mexico, which agree with the description given by Walker and that given by van der Wulp so closely that there is no reason to consider them as other than the same species. The specimens which I have examined are in the collection of the Illinois State Laboratory of Natural History. The Brownsville specimens were collected by C. A. Hart.

*Contribution from Illinois Laboratory of Natural History.

Sciomyza apicata Loew.

This species is a synonym of *S. nigrimana* Meigen. The specimens in the Illinois State Lab. Nat. Hist. collection, from Algonquin, Ill., are in all particulars identical with this European species, which is well described by Schiner, Fauna Austriaca, Vol. II, p. 45. The species bears a close resemblance to *glabricula* Fallen, which has been recorded by Coquillett from Alaska, but the latter has short, narrow wings, and the fore tarsi are entirely black.

Sciomyza strigata v. d. Wulp.

This species is a synonym of *S. trabeculata* Loew. I have examined seven specimens in the above-mentioned collection from Tampico, Mexico, December 29, 1908. Van der Wulp obtained his specimens from Mexico City and Vera Cruz, while Loew obtained his from Texas. The species is close in general appearance to *nana* Fallen, differing noticeably in the wing markings. In *nana* the submarginal cell has only one transverse brown mark near the apex, while in *trabeculata* there are five or six distinct fasciæ in this cell. There is also in the latter species a small appendiculate vein, on the posterior surface of the fourth vein, at about the middle of the last section, which I have not seen in any specimen of *nana*.

Tetanocera lineata Day.

This species belongs to the genus *Hidroneura* Handel and is synonymous with *H. rufa* Panzer of the European fauna. Members of *Hidroneura* may be distinguished from other genera in Tetanocerinæ by their possession of the following characters: Antennæ projecting straight forward, second joint not longer than third, the latter obtuse at apex and without apical hairs; arista thickened, bare; frontal and thoracic bristles comparatively weak; outer cross vein biangulate.

I have before me three specimens belonging to this species from Algonquin, Ill., Nason, taken on July 20, October 3 and 16; one specimen, Urbana, Ill., May 27, 1889, taken at light, C. A. Hart, and one specimen, Lake Geneva, Wisconsin, taken by sweeping along shore, west end, September 2, 1892, C. A. Hart.

A NEW MESEMBRINE FLY.

BY FREDERICK KNAB,

Bureau of Entomology, U. S. Department of Agriculture, Washington, D. C.

The closest allies of the fly here described generally have been included in the genus *Mesembrina*. In 1908 Townsend divided the old genus, dismembering it into *Mesembrina*, *Metamesembrina* and *Eumesembrina*, with the following species as respective types: *M. mystacea* L., *M. meridiana* L., *M. latreillei* Rob.-Desv. (Smiths. Misc. Colls., vol. 51, p. 124). In 1911 Schnabl and Dziedzicki, without knowing Townsend's work, separated *M. mystacea* and *M. meridiana* generically, proposing for the latter the generic name *Neomesembrina* (Die Anthomyiden. Nova Acta, Kais.-Leop.-Car. Deutsch. Akad. d. Naturf., vol. 95, p. 226). *M. meridiana* having been already designated as the type of *Mesembrina* by Westwood in 1840, *Metamesembrina* Towns, and *Neomesembrina* Schnabl and Dziedz. fall as synonyms. Townsend, having discovered the error in nomenclature, in 1912 proposed the generic name *Hypodermodes* with *M. mystacea* as the type (Proc. Ent. Soc. Wash., vol. 14, p. 46). The following new species is congeneric and closely related with *Hypodermodes mystacea* (L.) of Europe, and apparently still nearer the Asiatic *H. decipiens* of Loew (Beschr. europ. Dipt., vol. 2, p. 239; 1871).

Hypodermodes solitaria, new species.

Female.—Head black, the frons about one-third the width of the head; parafacials yellowish-silvery pruinose. Antennæ black at base, the second joint ferruginous, the third deep brown, reddish at base; thickened portion of arista ferruginous. Palpi ferruginous yellow, with numerous short black bristles and a few long ones interspersed.

Mesonotum and scutellum clothed entirely with dull reddish yellow pile, the discal macrochætæ also yellowish, the peripheral ones black. Pleuræ black, the vestiture black, one specimen with some yellowish hairs below wing-base. Sternopleural bristles: 1 - 0.1.

Abdomen black, the proximal portion covered with short black pile, the last two segments above and beneath with long reddish

yellow pile, somewhat brighter coloured than that on the mesonotum and scutellum.

Legs entirely black; claws ferruginous on the thickened basal portion, black distally; pulvilli yellowish brown.

Wings with the venation similar to *H. mystacea*, the apical cell at extreme tip of wing. Last section of the fourth vein very slightly less upward bent than in that species. Basal portion of the wing to the tip of the subcostal vein and the base of the apical cell bright yellow, the veins in that portion ferruginous yellow; portion beyond light grey, clouded with brown in the costal region and along the veins, the veins themselves black. Tegulæ yellow, with deep yellow margin and yellow ciliation.

Length: Body about 14 mm., wing 12.5 mm.

Two specimens: High River, Alberta (T. Baird); Glacier Park, Montana, June 28, 1912 (J. R. Parker). Type and paratype in the collections of the U. S. National Museum and the Montana Agricultural College.

The specimen recorded by Prof. Hine from Lake Timagami, Ontario, under the name *Mesembrina mystacea* (Can. Ent., vol. 39, p. 98; 1907), evidently belongs to the species here characterized. The present form differs from *mystacea* particularly in the coloration of the thoracic vestiture and of the tegulæ, that species having the vestiture on the posterior part of the mesonotum and on the scutellum black, and furthermore dark brown tegulæ with black ciliation. *H. solitaria* agrees much more closely with *H. decipiens*. That species also has the mesonotum and scutellum clothed entirely with yellowish pile and the tegulæ yellow. In *decipiens* the last two abdominal segments are clothed with yellowish white pile and the hairs on the cheeks are dirty white. The whitish abdominal hairs, as against their deep yellow colour in our form, can hardly be considered a specific character, since Loew (l. c.) has already pointed out that the colour of this pile is variable in *H. mystacea;* the difference in the colour of the cheek vestiture, being black in our species, must, however, be considered specific.

NOTES ON THE HYMENOPTERA TRICHOGRAMMATIDÆ AND MYMARIDÆ.*

BY A. A. GIRAULT, NELSON, N. Q., AUSTRALIA.

1. **Trichogramma australicum** Girault.

Herr P. van der Goot of Pasoeroean, Java, sent me a large number of both sexes of this species labelled "Pasoeroean, April 25, 1913. Aus *Chilo infuscatellus* Eiern." This is the first known host of the species, though in Queensland it attacks native Lepidoptera.

A female of this species was captured at Nelson, North Queensland, by sweeping jungle, June 16, 1913 (A. P. Dodd).

In another lot sent by Van der Goot, reared from the eggs of "ocler djagoén," an unknown tortricid and dated "Pasoeroean, 2 May, 1913," one of the males bore a single cilium in the cephalic line of the hind wings; no trace of this cephalic line could be found in any of the others. The colour in these two lots varied considerably. Thus in some specimens there were two broad bands of black across the abdomen, one at the tip, the other at base. In others the abdomen was wholly blackish, while in still others it was wholly jet black, the usual bright golden yellow of the thorax very dull and hardly contrasting. These variants were all females.

2. **Paranagrus optabilis** Perkins.

A single male of this species was included within the second lot of the *Trichogramma australicum* noted above. It is probably not from the Lepidopterous eggs.

3. **Trichogrammatoidea nana** (Zehnter).

Herr P. van der Goot also sent me a number of both sexes of this species labelled "Pasoeroean, April 25, 1913. Aus *Diatræa striatalis* Eiern." All of these specimens were pale yellow, with a dusky black band across the base of the abdomen and the extreme tip of the abdomen dusky.

4. **Anagrus armatus** (Ashmead).

This cosmopolitan mymarid I have recently received from Van Dine in Porto Rico through the continued kindness of Dr. L. O. Howard. The two slides bore both sexes, labelled "208—

*Contribution No. 14, Entomological Laboratory, Bureau of Sugar Exp. Stations, Bundaberg, Queensland.

1911. From egg clusters of *Delphax saccharivora* in cane leaves. Collected Dec. 19, 1911. Rio Piedras, Porto Rico. Thos. H. Jones." Both the locality and the host are new. Also a female, with the following new variety:

5. **Aphelinoidea semifuscipennis** Girault, variety *allipes* nova.

Female.—Like *semifuscipennis*, but the antennæ and legs are pallid and the colour more yellowish; also the fore wings differ in details hard to describe, but the marginal cilia are finer and shorter and the discal cilia appear denser.

Two slides from Van Dine through Dr. Howard bearing three females and one male, five females respectively, labelled "126—1912. From egg clusters of a leaf-hopper. Rio Piedras, Porto Rico. Collected Feb. 1, 1912. Thos. H. Jones." The male did not differ from the female. *Types* (of *allipes*) in the U. S. National Museum, Washington, D. C., U. S. A. (Three females on the second slide; the one male and two remaining females practically destroyed.)

6. **Ufens niger** (Ashmead).

Two females from Van Dine mounted on a slide with the *Oligosita* following, labelled "335—1912. From leaf-hopper eggs in cane, collected April 20, 1912. Rio Piedras, Porto Rico. Thos. H. Jones." The species, heretofore, has been known only from the United States. It is associated with commercial crop plants.

7. **Oligosita comosipennis** Girault.

One female with the *Ufens* just noted. The species is connected with commercial crops, and thus is probably widely distributed. The locality is totally new.

8. **Brachistella prima** (Perkins).

Two females on the slide with the preceding two species. This insect was recently described from Mexico, where it was reared from jassid eggs in sugar cane. The spot from the stigmal vein in these specimens crosses to the caudal wing margin; the "irregularly smoky" of the basal part of the wing in the original description forms in these West Indian specimens a first or proximal band across the fore wing at the bend of the submarginal vein. The species is thus characterized by the two-banded fore wings. The specimens agree with the original description otherwise,

except that they bear three lines of discal cilia on the hind wing (visible distad, at least) and the accented part of the second or stigmal stripe of the fore wing is not on the stigmal vein, but just beneath (caudad of) it and is somewhat larger than it. There is no short oblique line of cilia back from the sessile stigmal vein. The discal ciliation is denser than with *Abbella subflava*, while the fore wings are narrower than those of *Brachistella acuminata*.

9. **Brachistella** Girault = *Abbella* Girault.

When arranging the genera of the Trichogrammatidæ, I reduced the value of the arrangement of the discal ciliation of the fore wing to a generic basis and upon this principle *Brachistella* was separated from *Abbella*. However, I am convinced in this case that the characteristic will not hold and that the two are identical. From *Iltys* Girault, *Abbella* differs in bearing a short sessile stigmal vein and a funicle which is shorter than the pedicel. Moreover, *Abbella* is much less robust.

10. **Trichogramma minutum** (Riley).

Dr. L. O. Howard sends me a microscopic mount with six specimens of this cosmopolitan species (three of each sex) bearing the label, "Reared from eggs of *Diatræa saccharalis*. F. W. Urich. Santa Lucrecia, Vera Cruz, Mexico. Ent. Ac. No. of D. L. Van Dine. 180—1913." Locality new.

Also two other slides labelled respectively, "Parasites from egg clusters of *Diatræa saccharalis*. Audubon Park, New Orleans, La., Sep. 13, 1912. G. E. Bodkin and T. E. Holloway," bearing seven females; "Parasites from eggs of *Diatræa saccharalis*. Donna, Texas, Oct. 1, 1912. T. E. Holloway," bearing one male, three females. Both localities are new.

All specimens in both of these lots were orange yellow, the abdomen two-banded, one broad stripe across the base and a narrow one across the apex; the male, however, bore a black abdomen nearly to tip, the latter yellow.

A vial of alcohol bearing nineteen females, many coloured as those of the two preceding slides, but others with the abdomen wholly black; also received through Dr. Howard the specimens labelled "311—1913. March 28, 1913. J. R. Bovell, Bridgetown, Barbadoes, B. W. I." The letter accompanying the speci-

mens gave this data. "From G. N. Wolcott, I have received Porto Rico accession 3011—1913. Egg parasite of *Diatræa saccharalis* Fabr." The number *3011* is doubtless a misprint for the number on the specimens, namely, *311*. The locality is new.

Another vial of alcohol bearing one male, twenty-three females and the label, "Reared from eggs of *Diatræa saccharalis*, Trinidad, B. W. I., November, 1912. F. W. Urich. Ac. No. of D. L. Van Dine 181—1913." In several of these specimens the posterior line of discal cilia in the hind wings was quite complete and six cilia in the oblique line from the stigmal vein rather common. The abdomen was dusky, with a darker stripe across the base.

A third vial bearing a large number of both sexes of *minutum* and these labels "Ac. No. of D. L. Van Dine 182—1913. Parasites bred from the egg-masses of *Diatræa saccharalis*. G. E. Bodkin, Georgetown, British Guiana, July 20, 1912." In these specimens the abdomen was dusky or else concolorous. The locality new.

And a fourth vial containing two males, twenty-six females, bearing the labels "Reared from eggs of *Diatræa saccharalis*. Ac. No. 172—1913. D. L. Van Dine. Porto Rico." The exact locality was Guanica and the collector Mr. H. Bourne. The date March 4, 1913; parasites issued four days later.

It is interesting to be able to record this parasite from the same host at the same time from such widely separated localities.

FIELD NOTES AND QUESTIONS.

Early Appearance of Pontia Rapæ.

On February 24th, of this year, a freshly emerged specimen of the "imported white butterfly" flew into an open window of a house in this city. It was promptly captured, and turned out to be *P. rapæ* var. *marginalis*, which is the early spring form of *rapæ* in this district. This is the earliest record that we have in Victoria —the nearest to it being March 28, 1903, recorded by Mr. E. M. Anderson. Perhaps a few dates of the Lepidoptera that have appeared during March may be of interest to our Eastern collectors:

Xylomiges candida, March 7th.
Xylomiges hiemalis, March 17th.

Xylomiges simplex, March 18th.
Graphiphora hibisci, March 14th.
Mesoleuca gratulata, March 17th.
Mesoleuca vasiliata, March 20th.
Eupithecia limnata, March 20th.
Nyctobia nigroangulata, March 20th.
Rheumaptera rubrosuffusata, March 17th.
Trichochlamys lacteata, March 10th.
Incisalia mossi, March 17th and 20th.

E. H. Blackmore, Victoria, B.C.

Gynandromorphous Lepidoptera.

At a meeting of the Montreal Branch reference was made to certain specimens of Lepidoptera exhibiting the characters of both sexes in the one individual, and these, as well as the references at hand in North American literature, indicated that the right side was male and the left side female. The question was raised as to whether this was invariably the case or merely chance in the few on record. Mr. Gibb kindly offered to ask the members of the South London Ent. Society, and the following reply has been received:—

"In answer to the question of the right side being always the male, it has often been so asserted; but I find that one gets it both ways, as the following list will show:

	RIGHT SIDE	LEFT SIDE	
Euchloe cardamines	♂	♀	
Lycæna ægon	♀	♂	
Lycæna icarus	♂	♀	(2 examples)
Lycæna icarus	♀	♂	
Lycæna corydon	♂	♀	
Smerinthus populi	♂	♀	
Smerinthus populi	♀	♂	
Endromis versicolor	♀	♂	
Eugonia quercinaria	♀	♂	
Coremia ferrugata	♀	♂	

In the last four species (moths) the antennæ show stronger sexual differences than the wings.

F. E. Adkin, F.E.S., London, England."

The occurrence of Rhyncholophus sp. on Lepidoptera, observed at Kaslo, B. C.

The occurrence of small ticks on the bodies of specimens of Lepidoptera has often been brought to my attention when examining freshly captured specimens.

I submitted some of the specimens to Dr. C. Gordon Hewitt, who wrote me that they were a species of *Rhyncholophus*, a mite which attaches itself to insects upon which it feeds. All the family are predacious and wander over plants and soil in search of prey.

My records of their occurrence during last spring show a wide range of host; specimens were taken from the following list. The number after the name denotes the number taken from each specimen listed. Amongst the Noctuids I noted

Tæniocampa communis Dyar, 7.
Tæniocampa curtica, 2
Hadena dubitans, 1.
Peridroma nigra, 3.
And on the Geometers
Mesoleuca intermediata, 1.
Cænocalpe magnoliata, 1.

The extreme variation in the size of these mites ranged from 1.4 mm., for the largest, to 0.4 mm. for the smallest specimen.

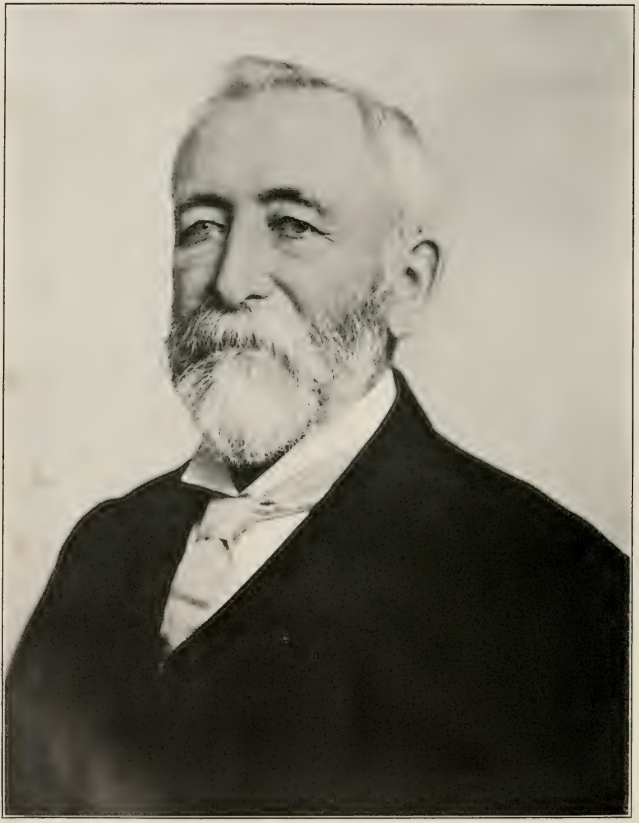
The colour in all cases was bright red, which is maintained in the specimens when mounted, provided that they are not submerged in ether too long, in which case the colour is either entirely lost in the smaller specimens or remains a dull orange.

The usual point of attachment is in the fold between the thorax and abdomen under the wings, but in one case I found one attached to the median nervule on the underside of the primary.

They are very resistant towards cyanide. Moths which had been placed in the killing bottle for over one hour were found to have mites attached, and these proved to be alive when examined the following morning.

J. Wm. Cockle, Kaslo, B. C.

Mailed September 8th, 1914.



DR. WILLIAM SAUNDERS, C. M. G.

The Canadian Entomologist.

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DR. WILLIAM SAUNDERS, C. M. G.

On Sunday afternoon, September 13th, after an illness which had continued for nearly two years, and which for a twelve-month had rendered him mentally incapable, Dr. William Saunders passed to his rest at his home in London, Ontario, in the 79th year of his age. He was born in Devonshire, England, and came to Canada with his parents when a boy of twelve. His educational advantages were meagre, but he succeeded in obtaining a technical training in Chemistry and set up in business as a retail druggist in London. His agreeable manners, thorough honesty and untiring industry brought him a fair measure of success. His love of nature led him to the collection of wild plants and insects which could be found in abundance in the neighbourhood, and he became an ardent student of Botany and Entomology. Finding many medicinal plants readily obtainable, he began the preparation of fluid extracts, which were so pure and reliable that they soon became widely and favourably known among the medical profession, and led by degrees to the establishment of an extensive and lucrative business both wholesale and retail. Years later, when he became Director of the Experimental Farms of the Dominion, the wholesale business was transferred to his eldest son, Mr. W. E. Saunders, by whom it is still successfully maintained, and the retail department to two of his younger sons, who, however, afterwards relinquished it for other pursuits.

During the five-and-twenty years of his business life, Mr. Saunders found time for taking an active part in many other things. Besides his scientific work in Entomology and Botany, he took great interest in fruit-growing, establishing a farm of his own near the city, and becoming a zealous member of the Ontario Fruit Growers' Association, of which he was a director for many years and President from 1882 to 1885. In connection with his professional work he was appointed Professor of Materia Medica in the Western University, Public Analyst for Western Ontario, and

President for two years of the Ontario College of Pharmacy, of which he was one of the founders. He was an active member of the American Pharmaceutical Society, and Fellow of the American Association for the Advancement of Science. His attendance at the meetings of these Societies held from year to year in various cities of North America caused him to have a widely extended friendship with notable men of all kinds, by whom he was highly esteemed and respected.

The writer's acquaintance with Dr. Saunders began more than fifty years ago, when we were both young men, and soon ripened into a warm friendship, which has continued unbroken until now during all these years. In those early days, when the study of Entomology was so difficult owing to the scarcity of books on the subject, we were in constant correspondence, helping each other in every way we could, and spending each summer some days together, comparing notes, studying specimens and making collecting expeditions. Many happy hours we spent together in early morning tramps to the ponds and woods about London, and in the evening, when his day's business was over, in examining the captures we had made. At that time there were few in Canada who took the least interest in the objects which to us afforded the keenest pleasure, but as time went on we found here and there a congenial spirit, and were led on in 1862 to attempt the organization of an Entomological Society. This was successfully accomplished during the following spring, and last year the completion of half a century's work and progress was celebrated by the Jubilee meeting at Guelph. An account of the proceedings on that occasion and the history of the formation and growth of the Society have been given in the November (1913) number of the "Canadian Entomologist" and the 44th Annual Report of the Society. In 1868 Mr. Saunders and the writer decided upon making another venture and began the publication of the "Canadian Entomologist," to the first two numbers of which we were the sole contributors. For five years the latter was the Editor, and was then succeeded by Mr. Saunders, who continued the management of the magazine until his removal to Ottawa in 1886. Three years previously there was published in Philadelphia his notable book, "Insects Injurious to Fruits," which is justly regarded as a classic by economic entomologists.

A second edition was issued in 1892, and the author had begun the preparation of a third, when his prolonged illness rendered him incapable of accomplishing any literary work. A list of his published articles, bulletins, reports, etc., fills six columns of the Bibliography in the Transactions of the Royal Society of Canada for 1894, and a large number have been added since. In 1881 he had been appointed by the Governor-General of Canada, the Marquis of Lorne, one of the original Fellows of the Royal Society, and in 1906 he was elected President, having thus risen to the highest position of honour for scientific work that can be attained in this Dominion. Twenty years ago it was said of him by an American writer that "by painstaking study and observation he has risen to the topmost pinnacle of fame as an entomologist, horticulturist and experimental agriculturist."

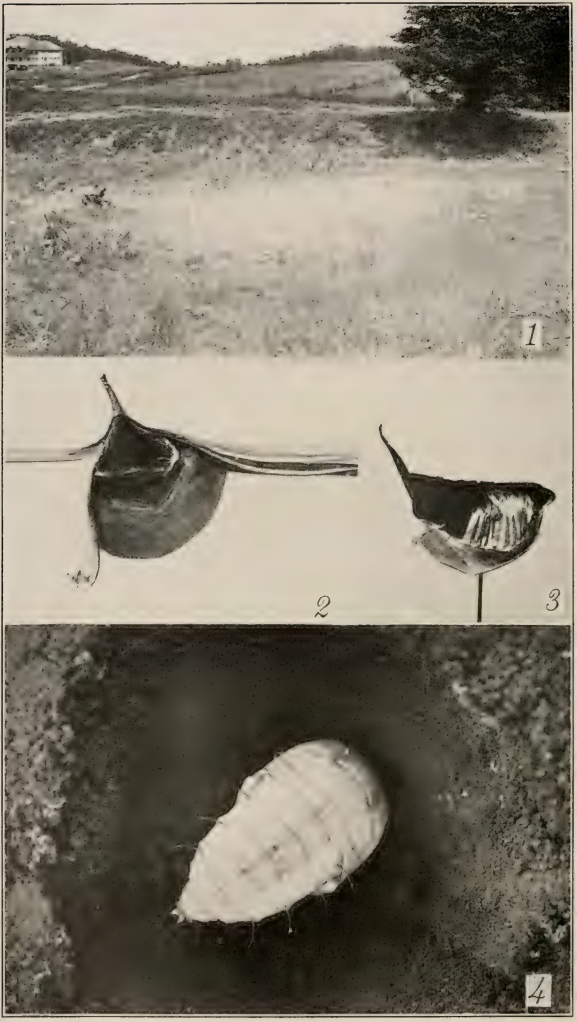
A very important change took place in the life and work of Dr. Saunders in 1886, when he was appointed Director of the Experimental Farms of the Dominion, and left his home and business in London to reside in Ottawa. During the previous year, he was commissioned by the government to visit various Experiment Stations in the United States and to report upon agricultural and experimental work in Europe and America. In this new sphere of labour he applied himself with his wonted vigour, and in the course of a few years was mainly instrumental in bringing these establishments into thorough working order and into a high standard of excellence. Anyone who saw the Ottawa Farm in the autumn of 1886—a large tract of bare land, with workmen busily employed in levelling and removing stumps and boulders with dynamite—and then visited it ten or fifteen years later (as did the writer), could not fail to be impressed with the wonderful work accomplished by the genius of Dr. Saunders in turning a waste into a scene of beauty and a hive of industry. Here have been carried on under his direction a great variety of experiments in breeding and feeding live stock, testing soils and water, growing fruit and ornamental trees of all kinds, selecting hardy varieties, improving the size and quality of any fruits suited to the climate of the Western Provinces, beekeeping, experiments and observations in economic entomology, plant pathology, and various other matters pertaining to the welfare and benefit of the farming community. Especially

noteworthy was his work in crossing varieties of grain and producing new and improved kinds. One alone of these, the Marquis Wheat, is believed to have added millions of dollars to the value of the wheat products of the prairie country. All information thus acquired has been freely afforded to the farmers by distributions of seed, and bulletins and reports on all manner of subjects.

The ever-growing work and its extension in every Province of the Dominion began at length to tell upon the physical strength of the man who was the mainspring of it all. His vitality, owing to advancing years and the inroads of an insidious disease, began to fail, and he felt the time had come for his retirement. Accordingly he resigned about three years ago and went with his wife and daughter for a pleasure trip to Europe—his first real holiday since he went to Ottawa. His friends expected him to return with much improved health, but it was ordered otherwise; he became very ill in England and never entirely recovered. He had completed his life work, his duty was well done, and he has left the record of great deeds accomplished and of vast and widespread benefits conferred upon the people of the land. This account of a remarkable man would be incomplete without a reference to his beloved wife, who was a true helpmeet both in small things and in great, ever cheerful and encouraging, full of kindness and hospitality, perfectly unassuming and free from all affectation, she is loved and esteemed by all who know her, and her children and friends rise up and call her blessed. To her in her desolation and to her family in their sense of loss our sympathies go out in the fullest measure.

The ability and work of Dr. Saunders have been recognized in many gratifying ways. In 1905 he received the distinction of Companion of the Order of St. Michael and St. George, conferred by his Majesty King Edward; honorary LL.D. from Queen's University in 1896 and from the University of Toronto in 1904; the Mantua gold medal for distinction in scientific knowledge. He was a Fellow of the Entomological Society of London and the Royal Microscopical Society; an honorary member of the Pharmaceutical Society of Great Britain and of the Highland Agricultural Society of Scotland; and an ordinary member of a large number of Scientific Societies in the United States and Canada.

C. J. S. Bethune.



HYDROPHILUS TRIANGULARIS SAY.

NOTES ON *HYDROPHILUS TRIANGULARIS* SAY*

BY ROBERT MATHESON, PH. D., ITHACA, N. Y.

Although much study has been given to the European species *piceus* and much has been written of its life-history, anatomy and metamorphosis, scarcely anything has been published concerning the American species *triangularis* Say. Since the brief account given by H. Garman in the American Naturalist in 1881 I find but few references to this species in American literature. As this is one of our largest beetles, and is commonly met with in aquatic collecting, I hope this short account gathered from a brief study during the summer of 1912 may be of use to others working in this group.

The beetles undoubtedly hibernate and egg-laying occurs early in June. Garman found the egg-cases about the first of June at Normal, Ill., and in one case the female was in the act of finishing her case. I found the completed egg-cases at Ithaca on June 24 and 26. These egg-cases are peculiar and interesting structures. Although Garman has given a good description of the nidus, it may be worth while to redescribe it, as his paper is now inaccessible to the average worker in entomology.

The egg-case (pl. XXII, fig.2) is always attached to pieces of floating leaves, bits of weeds, etc., and never, as far as I know, to living plants. The case with the projecting horn-like mast floats gracefully on the surface of the water. The cases must be sought with considerable care, as they are not easily recognized among the floating debris. I have found them most commonly in shallow pools with abundant vegetation and rich in insect life (Pl. XXII, fig. 1.) The leaf to which it is usually attached serves as a float and aids in keeping the mast erect and above the surface of the water. The case is smooth, brownish in colour, the upper surface closely adhering to its support (Pl. XXII, fig. 2.) It measures about 22 mm. wide, 24 mm. long and 15 mm. deep. The horn-like process is usually about 7–8 mm. long, and projects from the front of the case almost at right angles to the upper surface. It is dense, hard and almost black in colour, composed of closely-woven strands of silk. Below it expands into a broad hatchet-shaped plate, as seen in figure 2. It is supposed that this horn, which is really a very

*Contribution from the Entomological Laboratory of Cornell University.
October, 1914.

small tube with dense walls, functions in the admission of air into the egg chamber. Whether this is so or not I could not determine in the few experiments I performed. Below the broad expanded base of the spine is a narrow lunar-shaped opening (figs. 2 and 3). This allows the entrance of water beneath the egg-case proper, and through it the newly-hatched larvæ escape. This outer sheet of silk enveloping the egg-case is very thin and semi-transparent. Through it one can readily observe the young larvæ as they hatch and crawl into this space before venturing out into the open pond.

The eggs form a disk-like mass suspended from the roof of the egg-case (Pl. XXII, fig. 3.) They are all arranged vertically, closely applied to each other and in a single layer. Above the eggs the roof is composed of a considerable thickness of rather loosely-woven silk, leaving comparatively large, open spaces. Each egg measures 4 mm. long and about 1 mm. in diameter, yellow in colour, and loosely wrapped in its own coat of silk. Although I have examined these egg-cases carefully, I have never found any water in the portion containing the eggs. It would seem as if the open spaces in the loosely-woven silk and connected with the horn-like process in front serve as a means of air supply for the developing embryos. The number of eggs in a single case is very large, and it is not known how many egg-cases may be made by a single female. In the two egg-cases counted there were 112 and 130 eggs, while Garman found 107 in the one counted by him.

The young larvæ on hatching do not immediately leave the egg-case. On the evening of June 25th I saw quite a number of the newly-hatched fellows crawl out into the space below the eggs, but they did not venture further. Next morning this space was literally swarming with them, so crowded that they could not attack each other. Shortly after they began to emerge; slowly at first and then more rapidly. Soon the small aquarium was a seething mass of wriggling savages. They nipped at each other fiercely, each shying off, but soon one got a death-grip. The successful grip is directly back of the large head (fig. 29), for then the larva is helpless, and the other little savages soon close in and complete the killing. One is not much of a feast for over a hundred hungry chaps, and the first taste is only the beginning. After considerable manœuvring, another is seized and the

feast is again repeated. This would have continued, I presume, till all but one were killed. To prevent it I placed in their midst a young tadpole which had just died. For a short time they seemed shy of it, such a feast was surely too good, but when they closed in it was with a rush. Soon there was nothing to be seen but a wriggling mass of fierce savages tearing and biting at every available spot. As one secured a tender morsel he would rush off with it, hoping to enjoy it in peace, but only to be attacked by his neighbour. This fighting and scrambling continued until the entire tadpole was devoured. Later in the evening of the same day I gave them a dead minnow, and next morning only the bones were left. In the meantime one would occasionally succumb to the attacks of his neighbours, and my stock was slowly decreasing in numbers. On June 28 I placed a living tadpole in the aquarium, and there followed a savage attack on it. The larvæ seized it by the tail, mouth, and eyes, and every available spot where a grip could be secured was tried time and time again. It was not long before they succeeded in overcoming the tadpole, and then followed a feast mingled with occasional cannibalistic attacks. For sometime after this I continued to feed them on tadpoles, and they seemed to thrive.

On July 3rd one larva molted. This one was separated from the rest, and an attempt made to rear it. The next day most of the other larvæ died on account of the extreme heat. The one that had molted continued to thrive on tadpoles, snails or other food which I gave it. It was interesting to see how readily it would remove a snail from its shell by means of its powerful mandibles. The flattened head made it easy to get under the shell, and the mandibles did the rest. On July 24 this larva entered the soil to pupate. It had evidently molted a second time, but I had failed to find the shed skin, or else it was eaten by the larva itself. It took a little over twenty-four hours to dig out a large pupal cell under a stone in the rearing-cage. Pupation occurred on July 26, and the pupa resting in its cell is shown in figure 4. The adult emerged on the 6th. The time of development is then as follows:

June 25.—Young larvæ began emerging.

July 3.—First molt occurred.

July 13 (about).—Second molt occurred (?) (Supposed, not observed).

July 24.—Entered the soil to pupate.

July 26.—Pupa formed.

Aug. 6.—Emergence of adult.

Two other larvæ which I collected the same season pupated on July 15th and the adults emerged on the 25th.

At the time of transformation of pupa to adult it is interesting to observe how long it requires for the beetle to acquire its normal black colour. At the time of transformation to adult the thorax, head and legs are bright reddish brown. The rest of the body is pure white. Gradually it becomes reddish brown, turning to black. In about twenty-four hours after transformation the beetle is perfectly coloured and ready to emerge.

Description of larva.—First stage (fig. 29). The young larva on leaving the egg-case is light brown in colour, later becoming dark velvety brown and measures over 8 mm. in length, from the tip of the abdomen to the tips of the extended maxillæ. The head is large, light brown in colour, somewhat depressed and prominent, the mouthparts forming a very conspicuous feature. It measures, exclusive of the extended mouthparts, 2 mm. long by 2.25 mm. wide, and appears very large in proportion to the body, the thorax measuring less than 1.5 mm. wide. The antennæ are prominent, each consisting of three segments. The ocelli are six in number, placed in two parallel rows at the side of the head, directly behind and below the antennæ.

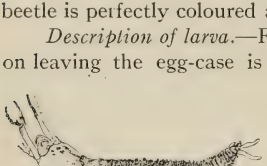


Fig. 29.—*H. triangularis*, young larva just hatched.

The body is densely clothed with dark hairs, giving the larva a velvety appearance. Amongst the hairs may be found scattered brown setæ. The seven abdominal spiracles are prominent. On the dorsal side of the last abdominal segment are openings leading to the large longitudinal tracheal trunks which supply air to all parts of the body. This pair of spiracles, with the two pairs on

the thorax, make in all ten pairs. I have not attempted to determine whether the lateral spiracles are closed or not.

Arising from the under side of the last segment is a pair of light coloured cerci, cylindrical, soft and flexible, measuring .9 mm. in length. The function of these cerci is not known, unless they serve to aid the larva in maintaining itself on the surface film when it requires a fresh supply of air.

The legs are long, of the same colour as the head, and well fitted for walking or running. The femora of all three pairs of legs are also provided with swimming fringes. The larvæ, however, are not very capable swimmers, only swimming short distances between supports.

The mature larva.—(Fig. 30.) The larva ready to pupate measures 40 mm. ($1^9/_{16}$ ins.) long and about 9 mm. wide at its widest part. It is dark brown in colour, the head being reddish brown. The under surface of the body is almost a grayish brown. The legs are the same colour as the head. Extending from the anterior margin of the thorax on each side of the median line to the tip of the abdomen is an irregular narrow grayish brown line. These lines stand out prominently in alcoholic specimens.

Fig. 30.—*H. triangularis*, mature larva.

The head is large, depressed, reddish brown in colour with numerous darker markings. It is not out of proportion to the rest of the body, as in the case of the young larva (compare figs. 29 and 30). The antennæ are located on the upper side of the head, 4-jointed, 1st joint, 3.25 mm.; 2nd, .24 mm.; 3rd, .64 mm.; 4th, .64 mm. (Figure 31). An antennal sclerite is present and well differentiated. Each eye consists of six ocelli, situated behind and below the antennæ in two parallel rows of three each.

The mouthparts are well developed and prominent. The suture between the labrum and clypeus is very indistinct or lacking. The clypeus-labrum is black, broadly emarginate in front. The mandibles are large and powerful. The right is more slender, longer and more strongly curved with a large tooth on its cutting edge. The left is shorter and thicker, and lacks the large tooth, though a slight elevation marks the position (fig. 31).

A maxilla is shown in figure 31. The maxillæ stand out prominently, particularly in the young larvæ. The cardo is

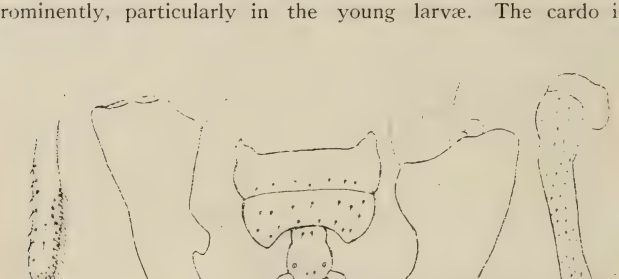


Fig. 31.—(From left to right.) Antenna, right mandible, labium, left mandible, maxilla.

greatly elongated, the lacinia being reduced to a mere joint. The palpus is 3-jointed.

The pupa.—The pupa at time of transformation is pure white in colour, the eyes soon becoming dark, while the prothorax soon takes on a reddish-brown tinge. It measures, including the cerci, 24 mm. long by 14.5 mm. wide at its broadest part. The pupa rests in its chamber, as shown in figure 4, and is quite active when disturbed or exposed to the light, turning over or changing its position by sudden muscular contractions of the abdomen, The tender pupa does not come in contact with the soil, but rests on large, strong spines. (Pl. XXII, fig. 4).

The head lies incurved under the prothorax, and is not visible in a dorsal view. It is perfectly smooth, lacking spines or setæ.

The anterior margin of the pronotum at each side bears three long, backward-curving spines. Near the posterior margin there is a row of eight shorter spines. There are also several very short spines on the disk. On the dorsum of both the second and third thoracic segments is a pair of spines. The dorsal side of each of the first seven abdominal segments bears a transverse row of four spines (Pl. XXII, fig. 4). The spines of the outer row are much longer and dark brown at the tips. The ninth segment terminates in a pair of long, large cerci nearly 3.5 mm. long. In the pupal chamber the pupa normally rests venter downward, resting on the large curving spines of the pronotum and the cerci. On turning over it rests on the dorsal spines of the abdomen and thorax, so that the tender pupa is never brought directly in contact with the soil.

DESCRIPTIONS OF FOUR NEW TABANIDÆ, WITH REMARKS UPON *CHRYSOPS CURSIM.*

BY C. P. WHITNEY, MILFORD, N. H.

Tabanus birdiei, n. sp.

Female—Length 14-17 mm. Face white, densely covered with white hairs. Palpi yellow, slender, sparsely clothed with short hairs, extreme tip infuscated. Antennæ: two basal joints and base of third reddish yellow. Upper extremity of first joint black and covered with short black hairs. Third joint with upper angle rectangular or even obtuse, the joint beyond angle black. Eyes naked, purple with two green bands. Front wide, parallel, reddish brown, densely covered by white pollen and scattered erect black hairs. Callus prominent, shining brown, nearly square with a short, stout, tapering prolongation above. Thoracic dorsum brown with strongly marked white lines. Abdomen brown and white, the latter predominating and occupying the posterior margins of the segments, expanding into three rows of triangular spots. Venter yellowish, covered with white pollen. Legs tawny, tips of tibiæ and tarsi infuscated. Wings hyaline, large distinct clouds on cross-veins, divarication of third vein and at extremity of anal cell. First posterior cell somewhat coarctate.

Nine females, March and April, West Palm Beach, Fla. Named in remembrance of a young friend to whose kind assistance I am indebted for many fine specimens of Tabanidæ.

October, 1914.

In "Insects of Florida," recently published by Prof. C. W. Johnson, two of the above-described specimens captured in 1912 are mentioned as *cymatophorus* O. S. from which *birdiei* differs by its smaller size, clearer wings, wider front, nearly square callus, and shape of third antennal joint.

Tabanus milleri, n. sp.

Female—Length 8½-10 mm. Palpi white, with a slight yellowish tinge. Face covered by long white hairs. Antennæ fulvous, upper angle of third joint obtuse, annuli hardly infuscated. Front coarctate, dark yellow, sometimes almost black; no ocellar tubercle. Callus nearly black, rectangular, a line above. Eyes naked, dark green with a purple reflection and one distinct very dark purple band.

Thorax brown, with the usual lighter stripes. Abdomen black, segment margins yellowish white, expanding into three rows of spots, the medial row consisting mostly of white hairs, the lateral spots frequently fulvous, oblique and extending outward basally. Venter fuscous, margins white. Legs pale yellow, distal half of front tibiæ and tarsi black, the other legs less infuscated. Wings hyaline, stigma pale yellow, first posterior cell broadly open.

Dedicated to two young friends whose kindly services furnished me a large number of desirable Tabani.

A comparison of twenty *milleri* captured in Florida, at Mianii, St. Augustine and St. Petersburg, with a great number of *sparus*, taken in New Hampshire, affords no constant separating character except the invariably well-defined eye band in this new species. *Sparus* has no band, only a purple reflection. *Pumilus* has two bands, also other distinct differences.

Tabanus beatificus, n. sp.

Female—Length 15 mm. Antennæ black, third joint reddish at base, upper angle rectangular. Face, cheeks and palpi black. Front black, shining, callus transverse, protuberant. Connected above is a roundish convex spot extending across the front and nearly surrounded by light gray pollen. Vertex notched. Eyes naked, purple with three green bands. Thorax black, the gray lines scarcely perceptible. Abdomen black, densely covered with

appressed black hairs, except that laterally on the first three segments the hairs are white, forming broad, continuous grayish stripes of equal width with the median interspace. The fourth segment has traces of these stripes in narrow lateral and posterior fringes. Venter and legs very dark brown. Wings dark fuliginous, first posterior cell slightly coarctate.

One specimen received with other Florida Tabani from Rev. Geo. D. Hulst.

Chrysops ultimus, n. sp.

Female—Length 6½ mm. Face yellow, callosities and palpi black. Antennæ slender, reddish at base, becoming black apically. Front yellowish pollinose, callosity and ocellar region black. Thorax black, with two greenish median stripes, a bright yellow one just above the wings and two below. Scutellum, abdomen and venter black; an obsolete median dorsal stripe. Legs yellow; joints, distal half of tibiæ and tarsi infuscated. Wings: root, costal cell, cross-band and apical spot black. First basal cell completely infuscated, second hyaline. The cross-band is convex outwardly, almost reaching the divarication of the third vein and fills the fourth posterior cell. The fifth is semi-infuscate. The apical spot fills the second sub-marginal cell, except a dot at base, and crosses the first posterior. The hyaline triangle is very narrow, but crosses brokenly the marginal cell to the costa.

Taken at West Palm Beach, Florida, April 18th.

Chrysops cursim.

This species was described in the "Can. Ent." for 1879, Vol. II, Page 36.

In "Kansas Acad. of Science," Vol. X (1885-6) Prof. Williston, never having seen the species, remarks, "I do not see wherein this species differs from *C. pudicus* O. S." Presumably upon that authority *cursim* is placed in the "Tabanidæ of the World" as a synonym of *pudicus*.

Although no topotypes of *cursim* have been taken, the species has been found in several localities in New Jersey and Penn., and recognized, notably by Mr. Erich Daecke, who states he has never found intergrades of the two species. A specimen now in the collection of the Boston Soc. of Nat. Hist. was captured by Prof. A. P. Morse at West Peabody, Mass., July 13, 1911.

In comparison, *pudicus* may be said to have a black abdomen with yellow markings and *cursim* a yellow abdomen with black markings. The wing picture of *cursim* is as irregular as that of *delicatulus* and lighter coloured, while that of *pudicus* is dark and well defined.

THREE NEW SPECIES OF ODONATA.*

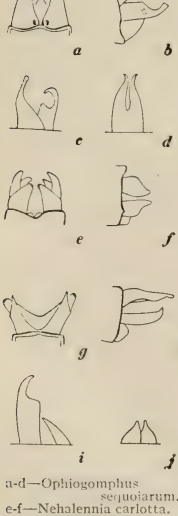
BY HORTENSE BUTLER, ITHACA, N. Y.

This paper contains the descriptions of three new species of dragonflies which were found while working over the material in the Cornell University collection, in the course of the preparation of a handbook of North American dragonflies.

Ophiogomphus sequoiarum, n. sp.

Total length ♂, 49 mm.; abdomen 34 mm.; hind wing 29 mm.

Total length ♀, 51 mm.; abdomen 34 mm.; hind wing 29 mm.



a-d—Ophiogomphus sequoiarum.
e-f—Nehalennia carlotta.
g-j—Gomphus abditus.

Face and occiput yellowish green, vertex dark brown, with paler transverse oval spot. Prothorax brown, with double median yellow spot on dorsum. Thorax olive green; on the dorsum a moderate stripe of dark brown, contracted on the collar; humeral and antehumeral stripes of dark brown, confluent above, with a narrow dividing line of olive green. Sides of thorax olive green, with a very narrow brown line on the last suture. Abdomen brownish, with hastate yellowish spots on dorsum of segments 1-9; dorsum of segment 10 more broadly yellow; sides of segments 1 and 2 inferiorly yellow, including the auricles; 8 and 9 also yellowish, excepting extreme margin of 8 apically. Legs dark brown, basal three-fourths of femora yellowish and studded with short, dark spines. Appendages yellowish (figs. a and b). Wings hyaline, costa indistinctly paler, stigma black.

October, 1914.

*Contribution from the Entomological Laboratory of Cornell University.

Female much like male, dorsum of the abdomen more broadly yellowish.

Male holotype, Three Rivers, Giant Forest, Tulare Co., Calif. 800-6500 ft., 16th July, 1907; collected by Dr. J. C. Bradley; now in the Cornell University collection. Female allotype from Sonoma Co., Calif., and a male paratype from the same place, both in the Cornell University collection. There are also paratypes of both sexes in the Museum of the Brooklyn Institute of Arts and Sciences.

Nehalennia carlotta, n. sp.

Total length ♂, 24 mm., abdomen 19 mm., hind wing 14 mm. Total length ♀, 28 mm., abdomen 21 mm., hind wing 17 mm.

Face pale with a narrow transverse brown stripe on the base of the labrum, and a similar broader stripe on the clypeus; vertex and occiput metallic bluish green, rear of occiput yellow. Dorsum of prothorax and thorax metallic bluish green, pale beneath, sutures and carinæ brown. Abdomen metallic bluish green on dorsum, pale beneath. The metallic green is abbreviated and bilobed on segment 8, and reduced to paired triangular basal spots on 9 and 10. Legs pale, dark line exteriorly on femora and tibiæ. Appendages (figs. e and f) light brown. Wings hyaline, stigma light yellowish, .5 mm. long, surmounting one cell. Colouring of female similar, but somewhat paler, the metallic bluish green on the terminal segments is less abbreviated.

Male holotype, female allotype, and several paratypes of both sexes, Saranac Inn, N. Y., July, 1900, collected by Dr. J. G. Needham; in the Cornell University collection.

This is the species referred to in Bulletin 68 of the New York State Museum, pp. 218, 249 and 250, as *Nehalennia gracilis.* A closer examination of the material and a comparison with the figures in Dr. Calvert's recent papers on the species of Nehalennia (Ent. News, Vol. XXIV, pp. 310-316, 373-374) prove this to be a new species.

Gomphus abditus, n. sp.

Total length ♂, 47 mm.; abdomen 33 mm.; hind wing 29. Total length ♀, 49 mm.; abdomen 36 mm.; hind wing 32 mm.

Face, occiput and vertex yellow, labrum narrowly bordered with brown, clypeus and middle portion of frons obscurely washed with brown. Prothorax brown with an irregular yellow median

line on dorsum. Thorax brown, marked with yellow as follows; A narrow line on the carina, extended laterally and dilated on the collar; a pair of dorsal stripes rounded above, more pointed at their divergent lower ends; a narrow isolated curved antehumeral stripe and a broad mid-lateral stripe, invaded by a narrow strip of brown extending upward before the stigma; yellow underneath. Abdomen dark brown, with hastate yellow basal spots on dorsum of segments 1-9. Segment 10 light brown, without markings. Sides of segments 1 and 2 wholly yellow, including the auricles; 8 and 9 also yellow, excepting the apical margins. Legs dark brown, paler basally; basal three-fourths of femora yellowish. Appendages (figs. g and h) light brown. Wings hyaline, extreme base indistinctly yellowish; stigma yellowish with brown veins, 3.5 mm. long.

Female similar in colouring; brown markings on the thorax broader; hind margin of occiput nearly straight, entirely hairy. On the male it is bare, except at the ends.

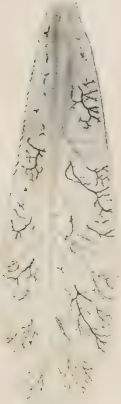
Male holotype, Chicopee, Mass., 20th June; female allotype of same place and date; both in the Cornell University Collection.

ENTOMOLOGICAL SOCIETY OF ONTARIO— ANNUAL MEETING.

The Fifty-first Annual Meeting of the Entomological Society of Ontario will be held at Toronto on Thursday and Friday, Nov. 5 and 6.

There will be a meeting of the Council on Thursday, at 11 a.m., in the University Biological Building, and at 2 p.m. the regular meetings will commence in the lecture-room of the Canadian Institute, 128 College St. A lantern will be available for those who wish to illustrate their papers with slides.

The Society is fortunate in having obtained the services of Prof. J. H. Comstock, of Cornell University, to deliver the public lecture, which will be given on Thursday evening in the Biological Building. His subject will be "The Habits of Spiders," and will be illustrated by lantern slides from Prof. Comstock's own photographs.



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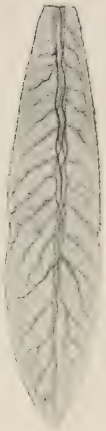

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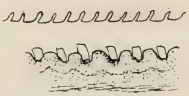

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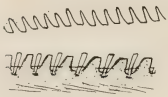

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NYMPHS OF CANADIAN ODONATA.

NEW AND LITTLE-KNOWN NYMPHS OF CANADIAN ODONATA.

BY E. M. WALKER, TORONTO, ONT.

Lestes unguiculatus Hagen.

Owing to the lack of material this species was very imperfectly described in my recent paper* on the nymphs of Lestes and was not included in the key. Since then I have reared a female imago from a nymph found in an artificial pond close to my house in Wychwood Park, Toronto. I also found another female exuvia. Adults of both sexes were common here and were the only species of Lestes present. The reared specimen emerged on July 12, at about 7.30 a.m.

In general appearance the nymph is quite similar to that of *rectangularis* with which it agrees closely in the form and size of the mentum of the labium and the ovipositor. In my key it runs to *rectangularis* and the following alterations may be made in the key to include both species.

DD. Mentum of labium 3.7-4.2 mm. long, rarely reaching beyond middle of hind coxæ; ovipositor just reaching apical margin of segment 10.

F. Inner part of lateral lobes of labium about three times as long as their middle breadth, the marginal teeth about as broad as long, truncated; teeth of middle lobe broader than long, rounded; mental setæ 6 or 7.....*unguiculatus.*

FF. Inner part of lateral lobes of labium about four times as long as their middle breadth, the marginal teeth longer than broad, more or less apically rounded; teeth of middle lobe about as long as their basal breadth; mental setae normally five..*rectangularis.*

Nymph.—Labium, when closely applied to ventral surface, extending caudad not quite to the base of the hind coxæ. The slender proximal part of the mentum is about 1.5 times as long as the expanded distal part and just before the latter it is narrowed to about one-sixth of the distal breadth, widening proximad to

*Can. Ent., XLVI, No. 6, p. 194.

about twice this breadth. Inner part of lateral lobes about three times as long as their middle breadth, the marginal teeth and those of the middle lobe somewhat shorter than in other species, except *congener*, the minute setæ alternating with the latter teeth stout and square-tipped (Pl. XXIII, fig. 1). Row of teeth between the two hooks of the outer part as in *rectangularis*, *disjunctus*, etc. Mental setæ 6 or 7: lateral setæ 3.

Lateral spines on abdominal segments 5-9; 8-13 spinules on lateral carinæ of segment 9. The ovipositor in the reared specimen reaches very slightly beyond the apical margin of segment 10, in the other it just reaches the margin. It is quite similar to that of *rectangularis*.

Gills broadest at about the proximal third, tapering gradually to the slender convexo-acute apices, the breadth at the distal third about two-thirds of that at the proximal third. Transverse bands rather faint in the two specimens examined but probably variable.

The colour pattern is not distinct in the exuviæ.

Length of body (without gills) 19.5-20; labium 3.9-4.2; outer-wing-pad 5.3; hind femur 5; gill 9-5; ovipositor 2.

Enallagma hageni (Walsh).

The nymph of this species has been described by Needham (Bull. 68, N.Y. State Mus., p. 254, 1903) but the description is insufficient for the recognition of the species. I have taken the nymphs in large numbers in several localities and have frequently bred them. They are readily known in the field (except from *E. ebrium*) by the spotted gills.

Nymph.—Eyes not very prominent (vide Can. Ent., XLV, No. 6, pl. 1, fig. 6); postero-lateral margins of head moderately convex with a few spinules, the the curve of the postero-median excavation somewhat broader and more flattened. Second antennal joint 3-3.5 times as long as thick. Labium with 3 mental setæ (occasionally a rudimentary fourth) and 5 or 6 lateral setæ; distal margin of lateral lobes with 6 or 7 teeth, the posterior (inner) three larger than the others which are minute and ill-defined.

Spinules on lateral margins of abdominal segments 2-8 increasing considerably in size from the base of each segment to the postero-lateral angles, when they form an irregular group, (fig. 32). Lateral appendages of male (pl. XXIII, figs. 6, 7) in profile subtriangular; viewed dorso-ventrally they appear broader than long, their free margins broadly convexly curved; upper surface slightly sulcate.

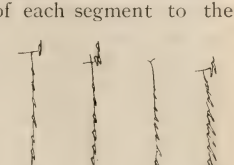


Fig. 32.—Spinules on right margin of seg. 8 in (a) *C. resolutum*, (b) *E. geminatum*, (c) *E. hageni*, (d) *E. caruncula tum*.

Gills (pl. XXIII, fig. 8) oblanceolate, broadest at the distal third, apices rounded or convexo-acute; middle gill about three times, lateral gills four times, as long as broad. About two-fifths to one-half of the upper margin of the median gill and about six-elevenths of the lower margins of the lateral gills are spinulose, the spinules being very minute at base but gradually enlarging to the end of the series where they abruptly terminate. Distally the margins are sparsely fringed with very short delicate setæ. The pigmentation consists of 10 or 12 irregular areas in which the tracheal branches are pigmented, separated by unpigmented areas, giving the gills a spotted or blotched appearance to the naked eye. Sometimes there is some diffuse pigmentation along the median axis.

On the dorsum of the abdomen is a pale median line, on each side of which is a more or less diffusely pigmented area, which sometimes forms a definite stripe. Legs more or less spotted, the femora having an anteapical and sometimes a basal dusky annulus, the tibiae also with a sub-basal annulus. There is also sometimes a dark lateral band on the thorax and abdomen.

Ovipositor reaching caudad well beyond the postero-ventral margin of segment 10; it is slightly surpassed by the sharp-pointed valves which reach the middle of the segment.

Length of body (without gills) 14-18; outer wing-pad 3.6-4.3; gills 4.5-7; hind femur 2.8-3.4.

Enallagma ebrium (Hagen).

Among a number of nymphs of *E. hageni*, obtained at Toronto Island, was a single male of *E. ebrium*, which emerged in the morning of June 4, 1914. This was the first individual to emerge

from this lot of nymphs and I naturally supposed that the others were also of this species as they appeared to be all alike. But not another *ebrium* emerged, all were *hageni*, and on returning a few weeks later to the spot where the nymphs were taken it was found to be swarming with Enallagmas, all of which, as far as I was able to determine, were *hageni*.

The nymph of *ebrium* appears to differ from that of *hageni* only in the form of the lateral appendages of the male (pl. XXII, figs. 4, 5). The shape of the head, parts of the labium, gills, etc., are all precisely as in *hageni*. In the single exuvia I have there are three mental setæ and a rudimentary fourth and six lateral setæ on each side; the distal margin of the lateral lobes of the labium bears three teeth of medium size, preceded by 3 or 4 very minute crenulations.

The lateral appendages seen in profile are bluntly rounded and about as deep as long; seen from above they appear much narrower than in *hageni*, especially distally, and the supero-internal surface is distinctly though shallowly and obliquely sulcate.

Length of body (without gills) 14.5; outer wing-pad 4.5; gills 6.8; hind femur 3.6.

Enallagma geminatum Kellicott.

I have bred a single female of this species, the nymph of which was taken in Grenadier Pond, Toronto, and transformed on July 2, 1914. In form it resembles the preceding two species but differs in the slenderer, unspotted gills and the less conspicuous spinules of the lateral margins of the abdominal segments which form a single series terminating in a pair at the postero-lateral angles. (Fig. 32, b.) In this respect it approaches *Coenagrion resolutum*.

The ovipositor is relatively longer than in *E. hageni*, nearly reaching the postero-ventral margin of segment 10, the apices of the valves just reaching this margin.

Labium with 3 mental setæ on each side and an additional rudiment on one side (4, occasionally 3, according to Needham); lateral setæ 5. Distal margin of lateral lobes with 3 rather large teeth preceded by a very short and indistinctly denticulated margin.

Lateral gills (pl. XXIII, fig. 9) slender, about six times as long as the greatest breadth, which is at about the distal third; apices acute. About six-elevenths of the upper margin is spinulose. Distad of this the margins are almost devoid of setæ. Pigmentation confined to the tracheal branches, scattered but not grouped to form blotches. The median gill is absent in the single exuvia I possess.

Length of body (without gills) 11; outer wing-pad 3.6; gill 4.2; hind femur 2.7.

Coenagrion resolutum Selys.

I found this species transforming at Prince Albert, Sask., June 24, 1913, and reared both sexes. I also reared a female at Toronto, which emerged on June 1, 1913, and a male from Wilcox Lake, Ont., which transformed on June 1, 1914. The following description was prepared from the exuviæ.

Nymph.—The nymph resembles that of *Ischnura verticalis* very closely but can be distinguished by the shape of the gills, and the lateral appendages of the male, and in the majority of cases by the larger number of mental setæ.

Form moderately slender, being about the same as in *I. verticalis*, *E. hageni*, *E. geminatum*, etc., but less slender than in *E. signatum* and *E. pollutum*. Eyes moderately prominent; posterior margins of head broadly rounded, forming where they meet the eyes a very slight emargination; six or eight spines of various sizes can be seen on the posterior margin from above and a variable, usually larger, number near the margin in ventral view. There is also a series of spinules of very variable number (4-12) along the postero-ventral margin of the eye. Antennæ generally 6-jointed, the 7th. joint, when present, seldom very distinctly indicated. The second joint is 4 or 4.5 times as long as thick.

Labium extending back to about midway between the front and middle coxæ; mentum subtriangular, the apical breadth about four-fifths of the length, the sides in the proximal two-thirds straight and diverging at an angle of about 45°, in the distal third feebly arcuate and diverging at a somewhat greater angle; median lobe strongly depressed, convexo-obtusangulate; mental setæ 4-6; lateral lobes shaped as in *Ischnura* and *Enallagma*, the distal margin

with 5 teeth, which increase in size caudad, and a short end-hook; movable hook half as long as the lateral lobe; lateral setæ 6 or 7.

Lateral margins of abdominal segments 2-9 with a single, nearly straight series of small spinules, which increase somewhat irregularly in size caudad on each segment (fig. 32, a). Gills (pl. XXIII, fig. 10) unpigmented (in the reared female from Prince Albert there is a transverse dark streak near the division), 4.5-5 times as long as the greatest breadth, which is a little distad of the middle; sides distally arcuate, apices acute but not acuminate. There is a distinct transverse division a little beyond the middle, proximad of which the lateral margins are spinulose, distad smooth with fine hairs. All the exuviæ except that of the female reared at Prince Albert are practically unpigmented. This one is brownish, the abdomen with a median pale line between two darker ones and the femora each with a pale anteapical annulus.

Length of body (without gills) 13-14, outer wing-pad 3.9-4.5; gills 5-6; hind femur 3-0-3.6.

The most accurate means of distinguishing the nymph of this species from that of *Ischnura verticalis* is the form of the gills, which in the latter species, are much more tapering and somewhat acuminate apically and the division is proximad of the middle (pl. XXIII, fig 12). The tracheal branches are also more or less pigmented and there is at least one dark transverse streak. The males can also be distinguished by the form of the lateral appendages (fig. 33), which in *resolutum* are deeper and in profile present a broad posterior surface, not represented in *verticalis*.

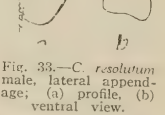


Fig. 33.—*C. resolutum* male, lateral appendage; (a) profile, (b) ventral view.

From the nymphs of *Enallagma* that I possess, viz. *E. calverti, hageni, ebrium, geminatum, carunculatum, signatum* and *pollutum*, *C. resolutum* differs in the arrangement of the spinules upon the lateral margins of the abdominal segments, which form a single series throughout, not being crowded into a group at the postero-lateral angles. This difference is very slight in the case of *E. geminatum* (fig. 32,b) in which this group of spinules is reduced to a pair. *Resolutum* also differs from these species of *Enallagma*, except *E. calverti*, in the larger number of mental and normally also of lateral setæ, there being usually in *Enallagma*,

3 mental and 5 lateral setæ. In *E. calverti* there are four mental and 6, or sometimes 5, lateral setæ. *Calverti*, however, is much larger with very dark gills, and in all the Enallagmas the gills are more or less pigmented. *E. geminatum* is the most like *C. resolutum* of the species mentioned, but the branches of the tracheae of the gills are less regularly distributed and are distinctly pigmented, and the lateral lobes of the labium have only five lateral setæ (as known at present). In *carunculatum* the lateral appendages of the male are much like those of *resolutum* but the spinules of the abdominal segments are much coarser (fig. 32, d)

Ischnura cervula Selys.

Several nymphs of this species were taken by the writer from the reedy margin of a large pond in the Bow Valley, at Banff, Alta. A female was reared from one of these nymphs at the Biological Station, near Nanaimo, Vancouver Is., emerging on July 20, 1913.

Form of body identical with that of *I. verticalis* the only distinctive character being found in the shape and pigmentation of the gills.

Eyes moderately prominent, posterior margins of head broadly rounded, forming where they meet the eye a very slight emargination. Posterior surface of head with numerous spines, and a series of minute spinules of variable number along the postero-ventral margin of the eye. Antennæ 7-jointed, the second joint 4-4.5 times as long as thick. Labium extending back to about midway between the bases of the first and second coxæ, sides of mentum almost straight, there being only a very slight increase in the angle of divergence at about the distal three-fifths; breadth at base of lateral lobes about five-sixths of the length; median lobe not very strongly depressed, bluntly obtusangulate; lateral lobes shaped as in *I. verticalis*, *C. resolutum*, etc., distal margin with two or three very minute teeth, preceding three much larger ones; end-hook a trifle larger than in *verticalis;* movable hook half as long as the lateral lobe; mental setæ 4 (rarely 5 on one side); lateral setæ 5 or 6.

Lateral margins of abdominal segments with a series of very short black spinules, forming several irregular rows. Gills (pl.

XXIII, fig. 11) gradually widening from base to distal third, where the breadth is about one-fifth of their length, apically acuminate, terminating in a long slender point; division slightly proximad of the middle. There is a pale ill-defined median area of greater or less extent, the peripheral parts being more transparent. The dark pigment is distributed along the median tracheæ. the lateral branches beyond the pale area, and in three transverse, more or less crescentic bands, one at the division, another near the apex and a third between these two; one of these, the basal or the middle band is more conspicuous than the others. The apical band is faint and may be scarcely recognizable.

The colour-pattern in other respects is entirely similar to that of *I. verticalis*. All my specimens are rather conspicuously marked but it is probable that the same variations are found in *I. cervula* as in *I. verticalis*. The general colour of alcoholic specimens is a moderately dark brown, spotted and banded with pale yellowish. The dorsum of the head is marked with a number of pale roundish spots, the thorax is more or less distinctly variegated with pale markings and the abdomen longitudinally striped, there being a pale median line between two broader dark bands, and on each side a dorso-lateral and a lateral pale streak. The legs are pale, distinctly ringed with brown, both femora and tibiæ being darkened at base, and having each two dark annuli.

Length of body (without gills) 11.2-12.5; outer wing-pad 3.6-3.9; gills 6; hind femur 3.

Explanation of Plate XXIII.

Fig. 1. *Lestes unguiculatus*, teeth of median and lateral lobes of labium, greatly magnified.

Fig. 2. *Lestes forcipatus*, teeth of median and lateral lobes of labium.

Fig. 3. *Lestes rectangularis*, teeth of median and lateral lobes of labium.

Fig. 4. *Enallagma ebrium*, right lateral appendage of male nymph, profile view.

Fig. 5. *Enallagma ebrium*, same, dorsal view.

Fig 6. *Enallagma hageni*, right lateral appendage of male nymph, profile view.

Fig. 7. *Enallagma hageni*, same, dorsal view.
Fig. 8. *Enallagma hageni*, lateral gill.
Fig. 9. *Enallagma geminatum*, lateral gill.
Fig. 10. *Coenagrion resolutum*, lateral gill.
Fig. 11. *Ischnura cervula*, lateral gill.
Fig. 12. *Ischnura verticalis*, lateral gill.

(To be continued)

NEW SOUTH AMERICAN MEMBRACIDÆ.*

BY W. D. FUNKHOUSER, ITHACA, N. Y.

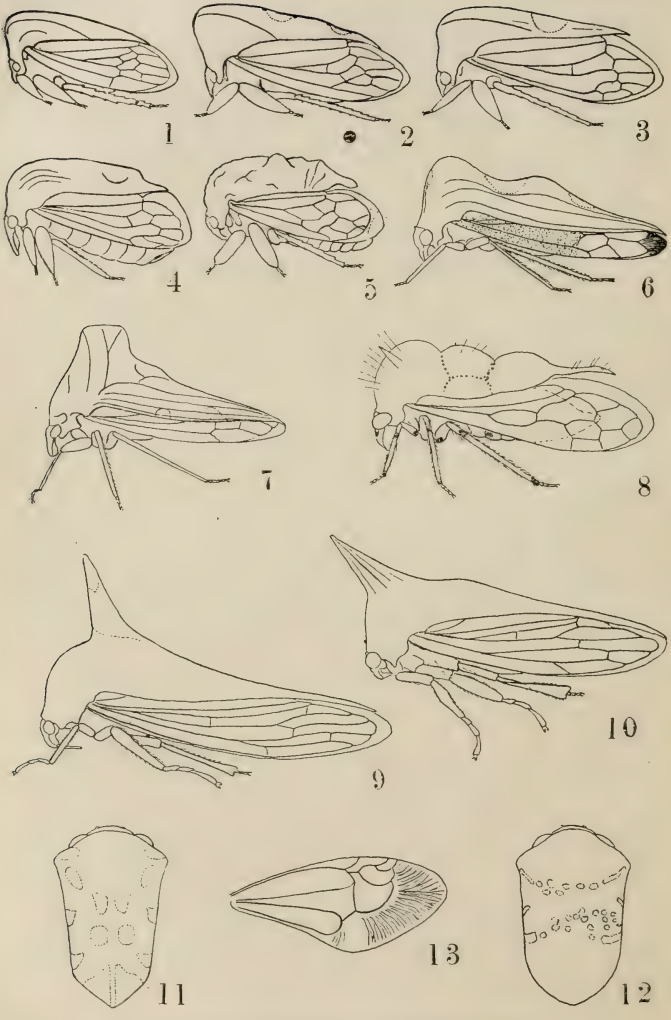
Subfamily *MEMBRACINÆ.*

1. Tropidoscyta brunneidorsata, sp. nov. (Pl. XXIV, fig. 1).

Near *T. pœcila* Germ., but differing in size, colour and in the shape and sculpture of the pronotum. A series of eleven specimens of this species from Peru and one specimen from Bolivia shows practically no variation and no tendency to gradate towards *T. pœcila*, to which it seems most nearly related.

Uniform dark chocolate brown, almost black, except the region between the first two lateral ridges, which is bright yellow brown, showing a characteristic light longitudinal band down the median line when viewed from the dorsal aspect. Obtriangular, humeral angles prominent and round, posterior process long and gradually acuminate. Head twice as long as wide; cheeks not extending beyond internal margin of eyes; eyes dull yellow, mottled with brown; ocelli farther from each other than from the eyes; black spot above each ocellus; face covered with fine, short, golden hairs. Pronotum high and projecting well forward anteriorly; transverse black mark on each side in front; sharp median keel extending from margin of head to tip of posterior process; two distinct ridges on each side, the first beginning close to the median line at the anterior apex of the pronotum, gradually extending away from the line, and ending at the lateral margin half way between the humeral angle and the posterior tip, the second extending as a semicircular ridge just over the humeral angles, not reaching the lateral margin; dorsal and lateral margins of the pronotum almost straight,

*Contribution from the Entomological Laboratory of Cornell University.
October, 1914



SOUTH AMERICAN MEMBRACIDÆ.

not sinuate or bulbous; posterior extremity reaching just beyond internal angle of tegmina. Entire pronotum very finely punctured and sparsely covered with short golden hairs. Tegmina black at base, gradually becoming brown in middle, with apical third yellow hyaline; three discoidal areas; two transverse rows of light brown spots in central portion, three spots in first row and six in second. Under surface of body black. Legs dark brown, tarsi yellow; first and second pairs of tibiæ much flattened.

Type.—Female.

Length, including closed tegmina: Female 4 mm., male 3.2 mm.; width between humeral angles, female 1.8 mm., male 1.6 mm.

Locality.—Marcapata, Peru.

The male, besides being smaller, is much darker and more distinctly punctured, and the wings lack the two transverse rows of spots.

2. **Tropidoscyta binotata,** sp. nov. (Fig. 2).

Close to the preceding, but larger and differs in sculpture and colour. May be easily recognized by the single ridge over each humeral angle, and by two white spots on the median dorsal line.

Head, body, wings and legs uniform yellow, except eyes, which are dark brown, and two white spots on median ridge of pronotum, one just before the middle and one just before the extremity of posterior process; each white spot having a black mark at each end. Head about twice as long as wide, lorœ extending slightly beyond internal margin of eyes; finely punctate and pubescent; ocelli farther from each other than from the eyes. Pronotum strongly projecting forward, finely and deeply punctate and sparsely pubescent with golden hairs; median ridge strong and percurrent, very lightly sinuate; posterior process gradually acuminate, somewhat depressed at apex and extending beyond internal angle of tegmina and beyond abdomen; one strong lateral carina on each side, starting at extreme anterior apex of pronotum and extending to a point on the lateral margin, one-third way from humeral angle to posterior end. Tegmina opaque yellow, without markings, base and costal areas densely punctate; three discoidal areas. Legs yellow; fore and middle tibiæ much flattened; hind tibiæ thin, with black-tipped spines. Tarsi concolorous yellow.

Type.—Female.

Length from anterior apex to tip of tegmina, female 5 mm., male 4.2 mm.; width between humeral angles, female 2.2 mm., male 1.8 mm.

Locality.—Espirito Santo, Brazil.

The male is somewhat darker, the veins of the tegmina much darker and more prominent, the basal half of tegmina and the under surface of the body deep ferruginous or black.

3. **Tropidoscyta maculata,** sp. nov. (Fig. 3).

Near *T. minor* Buckt., but differs in the sculpture of the pronotum, in the markings, and in the venation of the tegmina. May be recognized by the large white spot on the median dorsal line and by the fact that only two discoidal cells are present in the tegmina. This latter character would suggest the genus *Leioscyta* of Fowler, but the position of these cells is quite different from the forms figured by that author, and the high, rough, carinate pronotum at once prevents its admission to his genus.

Deep chocolate brown, except anterior half of median dorsal ridge, which is light yellow brown, spot behind this white hyaline, and apex of posterior process almost black. Head twice as long as wide, very dark brown, faintly punctured, densely pilose with long yellow hairs; ocelli yellow white, farther from each other than from the eyes; eyes brown. Pronotum thickly punctate and sparingly pilose; high percurrent median carina compressed into a sharp thin keel in the middle; one high, sharp, lateral carina on each side, beginning at extreme anterior apex and ending in about the middle before reaching the lateral margin; posterior process acute, extending just beyond internal angle of tegmina. Tegmina black at basal third, becoming ferruginous in middle and smoky hyaline at apical third; base finely punctate; veins somewhat pubescent; two discoidal cells. Legs ferruginous; first and second tibiæ flattened; tarsi flavous.

Type.—Female.

Length, female 4 mm., male 3.7 mm.; width, female 1.8 mm., male 1 5 mm.

Locality.—Peru.

The male is uniformly darker, with the white dorsal spot and the apical ends of the tegmina consequently more distinct.

4. **Bolbonota lutea,** sp. nov. (Fig. 4).

A fine, handsome species near *B. globosa* Fairm. In shape and size it much resembles *B. insignis* of Fowler, but differs in colour and sculpture, Fowler's species being shining, black and irregularly rigid, while *lutea* is uniform lemon yellow and almost smooth.

Head, body and legs light lemon yellow throughout. Head comparatively smooth, pubescent, twice as long as wide; ocelli slightly protruding; clypeus roughly diamond-shaped, with lateral angles extending beyond line of loræ. apex produced. Pronotum smooth, densely covered with yellow pubescence; humeral angles prominent and obtuse; percurrent median ridge high and lightly sinuate until just before the posterior apex, where it is abruptly declivous; posterior process blunt and triangular, just reaching internal angle of tegmina; three faint, short ridges over each humeral angle, the middle one most prominent; a depressed constriction just posterior to these ridges on each side of median carina, forming an apparent bulbous swelling before and behind it Tegmina comparatively narrow, exposing almost one-fourth of the abdomen below; flat, opaque; yellow slightly punctate and pubescent at base. Abdomen yellow and pubescent. Legs concolorous yellow with very fine black-tipped spines at apex of hind tibiæ.

Type.—Female.

Length 4.2 mm., width 2.6 mm.

Locality.—Espirito Santo, Brazil.

Described from four females.

5. **Bolbonota nigrata,** sp. nov. (Fig. 5).

Near *B. melaena* Germ., but differs in the structure of the dorsal surface and in being entirely without spots on pronotum or tegmina.

Entirely shining black, except extreme tips of tegmina, which are hyaline; very rough and corrugated. Head rough, finely punctate, sparsely pubescent; ocelli white, equidistant from each other and from the eyes; eyes dark brown, edged with white. Pronotum deeply and coarsely punctured, covered with irregular ridges and

bulbs. Median ridge percurrent, sharp and sinuate; humeral angles prominent; two large bulbs on each side median ridge, ridge thin between these bulbs; a Y-shaped ridge between humeral angle and first lateral bulb; posterior process blunt, subtriangular, slightly depressed, extending just beyond internal angle of tegmina. Tegmina velvety black, veins somewhat raised, extreme tip of marginal border hyaline. Abdomen black; segments edged with fine white line. Legs black; hind tibiæ strongly spined; tarsi flavous.

Type.—Female.

Length, female 3.6 mm., male 2.8 mm.; width, female 2.4 mm., male 2 mm.

Locality.—Bolivia.

The male differs only in size.

Subfamily *SMILIINÆ*.

6. Metheisa sinuata, sp. nov. (Fig. 6).

This species varies greatly in size and colour; the size ranges from four to seven millimeters, and the colour from light cinnamon brown to almost black. The sculpture and pattern of the pronotum, however, are constant. The pronotum is rather more elevated than in the other species of this genus, and is broadly sinuate in the middle; the tegmina usually show four apical and two discoidal cells, though in one specimen one of the discoidal cells is absent; the wings have four apical and no discoidal cells.

Head rough and sculptured; subtriangular, apex very sharp; clypeus almost square, somewhat pubescent; face deeply pitted; proximal margin of the head produced into a ridge. Prothorax elevated; median keel high and thin, sinuate in middle between rounded dorsal elevations, on either side of these elevations and between them a white patch, very distinct, even though the body colour may vary; on each side of pronotum three prominent ridges, deeply and coarsely punctate between them; humeral angles prominent and blunt; posterior process sharp, decurved, reaching just to the apex of the tegmina. Tegmina nearly half concealed by the pronotum; basal two-thirds opaque and roughly punctured; apical third hyaline, black spot at tip. Abdomen extending about

half as far as the tegmina, usually hidden by the opaque basal portion of the latter. Legs usually concolorous.

Type.—Female.

In the type specimen the colour is uniform light brown, with the pronotal ridges and the head slightly darker and shining. The males are, as a rule, darker and more inclined to show mottled patches.

Length (type) 7 mm.; width 2.5 mm.

Locality.—Peru.

(To be continued.)

NEW GENERA AND SPECIES OF SAWFLIES.*

BY ALEX. D. MACGILLIVRAY, UNIVERSITY OF ILLINOIS, URBANA, ILL.

The greater part of the following descriptions have been in hand for some time. Some of the species are of economic importance. The descriptions are offered at this time so that the names can be used by others.

Simplemphytus, n. gen.

Antennæ with nine segments; front wings with the free part of Sc_1 present, but short, the radial cross-vein present and the radio-medial cross-vein wanting; the medio-cubital cross-vein and media separating from Sc+R+M at the same point; the third anal vein deeply bowed at middle; the free part of the second anal vein present; the second abscissa of Cu subequal in length to the free part of M_4; the medio-cubital cross-vein and the free part of M_{3+4} parallel; the hind wings with the spur at the distal end of the cell R_{1+2} wanting, minute, or large; the free part of R_4 and the transverse part of M_2 wanting; the first anal cell petiolate and shorter than the cell in front of it; the posterior metatarsus shorter than all the following segments together. Type *Simplemphytus pacificus*, n. sp.

This genus is closely related to *Emphytus* in habitus and structure.

Simplemphytus pacificus, n. sp.

Female—Body coal-black, with the distal third of the front femora, the front tibiæ, the front metatarsi, and the knees of the

*Contributions from the Entomological Laboratories of the University of Illinois, No. 41.

middle legs, pale rufous or whitish; the antennæ short with the third segment longer than the fourth, the fourth and fifth subequal; the head, including the clypeus and labrum, densely punctured and setaceous, less abundant on the postocellar area; the malar space broad, the clypeus deeply roundly emarginate, the labrum set in the emargination; the supraclypeal area elevated, convex; the antennal furrows broad depressions; indistinct, line-like marks at the occiput; the ocellar basin broad, diamond-shaped, enclosing the median ocellus and extending to the median fovea, which is round, shallow, indistinct, and still less distinct in the male; the mesonotum, the metanotum, the pleuræ, and the pectus polished; the abdomen polished, densely setaceous; the saw guides convex above, straight on the proximal half below, convex on the distal half, joining the upper margin at the middle of the distal end and forming a pointed but bluntly rounded distal end. Length 7—9 mm.

Habitat—Troutdale, Oregon.

Described from specimens received from Professor H. F. Wilson, who reports it as boring into the stems of cherry.

Profenusa, gen.

Antennæ with nine segments; front wings with the free part of Sc_1 tuberculate; the radial cross-vein, the radio-medial cross-vein, and the free part of R_4 and R_5 present; the medio-cubital cross-vein separating from Sc+R+M near the point of origin of the free part of M and strongly divergent caudad with the free part of M_{3+4}; the anal cells petiolate; the scar of the free part of the third anal vein wanting; the free part of M_{4}+Cu_1 located midway between the mediocubital cross-vein and the free part of M_{3+4}; the hind wings with the cell R_{1+2} wanting; the free part of R_4 and the transverse part of M_2 wanting; the free part of the second anal vein present. Type, *Profenusa collaris*, n. sp.

This genus is closely related to *Messa* Leach, from which it is differentiated by the presence of the radio-medial cross-vein.

Profenusa collaris, n. sp.

Female—Body black, with the clypeus, labrum, malar space, the mandibles, the first segment of the antennæ, the tegulæ, a narrow margin to the pronotum, and the legs, for the most part,

whitish. The prothorax, except the parts named, the cephalic part of the mesopleuræ, and the pectus, rufous; the posterior femora more or less shaded with fuscous; the head smooth with antennal furrows interrupted on the middle of the face; the furrows surrounding the postocellar area deep and distinct; the vertical furrows not reaching the occiput; the median ocellus placed on a flat depression; a pit above the antennal socket; the median fovea minute but distinct; the clypeus truncate; the first and second antennal segments subequal, the third segment subequal to one and two together and longer than four; the saw-guides with the dorsal and ventral margins converging and the apex bluntly pointed; the male differs in having the rufous part of the thorax inclined to whitish and extending over the entire pleuræ, the venter of the abdomen and a broad band on the lateral part of the dorsal aspect, broader behind, sometimes fused on the meson, whitish; the posterior femora not fuscous. Length 3 to 4 mm.

Habitat—Massachusetts and New York.

This insect was first received May 10th, 1909, from Mr. Ralph W. Curtis, Assistant Superintendent of Parks of Boston, Mass., who reported the larvæ as mining the leaves of *Cratægus*. Larvae and adults were collected during the summer of 1911 by Mr. Andrew Rutherford in the Cascadilla ravine, Ithaca, N. Y., on *Cratægus*. It was also received during 1911 from Mr. P. J. Parrott, who reported it from Geneva, N. Y., where the larvæ were serious pests, mining the leaves of cherry.

Fenusa.—It has been shown by Mr. S. A. Rohwer that the type of this genus is *Tenthredo* (*Emphytus*) *pumila* Klg., which is congeneric with *Kaliosysphinga dohrnii* Tischbein, the type of *Kaliosysphinga*. *Fenusa* will therefore replace *Kaliosysphiga*, and another name must be used for the group of species hitherto included under *Fenusa*.

Messa.—It has also been shown by Mr. S. A. Rohwer that the type of the genus *Messa* Leach, a name hitherto erronously associated with certain species of Nematinæ, is *Tenthredo* (*Emphytus*) *hortulana* Klg., which is one of the species formerly associated with the generic name *Fenusa*. This name should, therefore, be used for those species and includes the American *Fenusa ambigua* Nort.

Euura maculata, n. sp.

Body black, with the head except a quadrangular spot about the ocelli and extending to the eyes, prothorax, margin of the lobes of the mesonotum narrowly, upper half of the pleuræ, tegulæ, legs, abdomen, except above at base, and saw-guides, except at apex, resinous; frontal crest indefinite and apparently wanting; median fovea a minute pit; saw-guides large, upper and lower margins slightly converging, and broadly rounded at apex. Length 7 mm.

Habitat—Collected by Professor J. S. Hine at Columbus, Ohio, and bears the number 169.

The form of the frontal crest distinguishes this species from all of the described eastern species.

Euura minuta, n. sp.

Body black, with head except a spot around the ocelli and occiput, pronotum, tegulæ, legs, and venter of abdomen, luteous; saw-guides straight above and broadly convexly rounded below, truncated at apex; frontal crest distinct and broken at middle; median fovea indefinite, represented only by a shallow depression in the frontal crest. Length 4 mm.

Habitat—Ames, Iowa. Professor E. D. Ball, collector.

This species is related to *nigra* Prov., from which it is separated by the colour of orbits and to *nodus* Walsh, from which it is separated by the indefinite median fovea.

Metallus bethunei, n. sp.

Female—Body black, with the two basal segments of the antennæ more or less, the trochanters, and the legs beyond the knees, white; the distal half of the posterior tibiæ sometimes more or less infuscated; the ocellar furrow adjacent to the median ocellus; the interocellar furrow wanting; depressed area behind the median ocellus broad; median fovea a broad, deep pit; lateral fovea distinct from lateral fovea; body polished with spare setigerous punctures; the front not punctate around the base of the antennæ; the stigma twice as long as broad; front wings with the free part of M_{3+4}+Cu_1 joining the cell M_4 at middle; the saw-guides straight above, somewhat oblique below, broadly obliquely rounded point at apex above. The antennæ of the male is longer and the segments broader and compressed. Length, 4 mm.

Habitat—Jordan Harbour and Saint Kits, Ontario, Canada.

Received from Mr. Lawson Caesar, who bred it from a leaf-mining larva on blackberry. The species is named for the Rev. C. J. S. Bethune. It is closely related to *rubi*, but readily separated from that species by the more oblique and blunter saw-guides.

BOOK REVIEW.

THE NATURAL HISTORY OF THE FARM. A Guide to the Practical Study of the Sources of our Living in Wild Nature. By James G. Needham, Professor of Limnology, General Biology and Nature Study in Cornell University. Ithaca, N. Y. The Comstock Publishing Company, 1913. $1.50.

Like Professor Needham's other writings this little book is marked by a freshness of viewpoint and a vigour of style entirely his own. Its aim is to give to the student something of that practical knowledge of nature possessed by the Indian and the pioneer, that personal acquaintance with common wild things, which was indispensible in the days when men were dependent upon their own hands for obtaining a living from the wilderness.

But it tells not only of the plants and animals from which we get our food, clothing and shelter, their relations to Mother Earth and to one another, but throughout the book the value of the beautiful in nature as an educational factor is never forgotten. It is this feature, that in our opinion gives the book its chief charm. The author's intimate first-hand knowledge of out-door nature and his keen sympathy with all her moods, are reflected throughout the book in such a way that the reader can scarcely fail to feel some of the charm of the wildwood, if he is at all responsive to its influence. Nor is there the slighest touch of that sentimentality which is apt to result from an attempt to record the charm of Nature in words.

The course of studies outlined, is divided into three parts, adapted respectively for the fall, spring and summer terms of the college-year; each part including 16 exercises. The studies cover a wide range of subjects and are all designed to bring the student into close contact with nature in all seasons and all

kinds of weather. They are not intended to give all the information demanded of the student. This is to be acquired at first hand. They are merely suggestive, serving to direct the student's powers of observation and to give coherence to the knowledge he obtains in the field. At the close of each chapter a definite programme of work is given, including suggestions for recording observations by means of notes, diagrams, etc. There is also included a number of optional exercises for the individual student, to be pursued independently.

An idea of the character of the studies may be obtained by glancing at the table of contents. In Part I we find such titles as "The wild fruits of the farm," "The farm stream," "The November seed crop," "The wild mammals of the farm," etc.; in Part II, "The lay of the land," "Winter activities of wild animals," "Fiber products of the farm," "The fence-row"; and in Part III, "The progress of the seasons," "The clovers," "Some insects at work on farm crops," "Insects molesting farm animals," Out in the rain," "The population of an old apple-tree," etc.

As several of these titles suggest, there are many references to insects and their ways. These are, for the most part, necessarily of a very general character, but mention may be made of a useful table for the recognition of aquatic insects in the immature stages, given in connection with the study of "The farm stream".

The book is illustrated by numerous well-chosen cuts, which with a few exceptions, are accurate and effective. It should be in the hands of every teacher of Nature Study.

THE types of the following species of Orthoptera, described the writer, the custody of which was not indicated in the original descriptions, have been deposited in the Royal Ontario Museum, Toronto: *Centhophilus pallidipes*, *Orchelimum manitobense*, *Nemobius griseus*, *Nomotettix borealis*, *Trimerotropis huroniana*, *T. sordida*, *T. longicornis*, *Podisma nuda* (=*Asemoplus nudus*) and *P. glacialis canadensis*.

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NEW AND LITTLE KNOWN NYMPHS OF CANADIAN ODONATA.

BY E. M. WALKER, TORONTO.

(Continued from p. 357.)

Æshna tuberculifera Walk.

This rare species was quite common at Lonely Lake, Vancouver Island, a forest pond about two miles from the Dominion Biological Station, Departure Bay. I obtained two mature nymphs, both of which were successfully reared, yielding a specimen of both sexes. Numerous exuviæ were also obtained. They were found in marshy coves, thickly grown up with reeds in water 12-20 inches deep, the conditions of environment being of the usual type that is characteristic of this genus. Six other species of Æshna were taken at the same spot.

Nymph (pl. XXV, figs. 1-3).—The nymph is long and slender and is remarkable for the length of the labium, which closely resembles that of *Anax junius* in both form and size. When closely applied to the ventral surface of the thorax, the hinge reaches the level of the hind coxæ, and this feature alone will serve to distinguish it from all other North American species of Æshna, in none of which the labium reaches back more than half way between the middle and hind coxæ. The length of the mentum slightly exceeds that of the hind femora, while in all other species the reverse is the case.

Eyes slightly less prominent antero-laterally than in other species of the *clepsydra* groups, with a rather long antero-posterior diameter. Lateral margins of head nearly straight, passing into the straight or slightly concave posterior margin by well rounded postero-lateral angles. Mentum of labium very long, the breadth at the base about half that at apex, which is slightly more than half the length; sides in proximal half straight and very slightly divergent, thence gradually curving outwards, the distal third moderately arcuate. Median lobe very broadly obtusangulate; lateral lobes with mar-

gins parallel, apices squarely truncate, the outer apical angle scarcely rounded, the inner with a small dark-brown tooth.

Supra-coxal processes rather small, acute, equal or the posterior sometimes slightly the broader, the apices not, or scarcely, divergent, the interval usually less than a right angle.

Wing-pads narrower than in most species, the outer pair reaching back to about the middle and sometimes the apical margin of segment 4.

Abdomen long and slender, broadest at segment 6 or 7, lateral spines on segments 6 to 9, not at all divergent, extending back on segment 6 one-third to one-half the distance to the hind margin of the segment; on segment 7 to the margin or nearly; on 8 slightly beyond the margin; on 9 to the middle or posterior fourth of segment 10. Lateral appendages three-fifths (male), three-fifths to four-sevenths (female) as long as the inferior appendages. Basal part of superior appendage of male about one-fourth or one-third shorter than the lateral appendages, its basal breadth almost or quite equal to its length, sides slightly concave, apex rather bluntly pointed.

Female genitalia reaching slightly beyond the posterior margin of segment 10; styli reaching end of ovipositor, their apices somewhat incurved.

Colour in life rather light brownish green or olivaceous; pattern as seen in the exuvia as follows: Dorsum of head behind the eyes with a pair of submedian brownish scars and a more or less indistinct oblique brownish streak or line on each side. Sometimes a pale lateral marginal band is present. Pronotum with a pale lateral margin, thorax nearly uniform brownish, with a few pale streaks on the pleura just above the middle and hind coxae. Femora in proximal half uniform brownish, distal half with a dark annulus between two pale annuli, of which the proximal is ill-defined. Tibiæ and tarsi concolorous. Abdomen with pale markings as follows: A median series of spindle-shaped spots, beginning on segment 1 as a narrow streak and ending on segment 7; a pair of ill-defined wavy dorso-lateral streaks, which break up into faint spots on segment 5 or 6, generally disappearing on the last 2-4 segments; a series of faint subcrescentic spots between the dorso-lateral punctae on the basal 3 or 4 segments only; and indications

of pale irregular blotches around the lateral scars. The dorsal and lateral punctae are darker than the ground colour and there are also diffuse darkened areas surrounding the mid-dorsal pale spots on most of the segments.

Length of body 41-45; mentum of labium 8.3-8.7; outer wing-pad, 9.5-9.9; hind femur 7.7-8.3; ovipositor, 3.2-3.5; width of head, 8.1-9; width of abdomen, 7.5-8.8.

In addition to the mature nymphs and exuviæ, we also found a nymph of the penultimate stage, which was successfully brought alive to Toronto and carried through the winter and spring until the time of emergence. During the winter (December to April), when it was kept in the cellar, upon a window-sill, it took no food, but at other times it was very voracious, on one occasion, soon after the long winter fast, feeding on a earthworm continuously for four hours. It underwent the last larval month on June 8 and began to transform into the adult on July 27. Unfortunately I was away from the city at this time and an accident prevented the successful emergence of the imago.

Æshna interrupta Walker.

The nymph described in my monograph as that of *A. interrupta* was correctly referred to this species. A nymph of the same kind, which I obtained at Banff, Alta., and kept for six weeks at the Biological Station, Vancouver Island, commenced to emerge during my homeward journey. The unfavourable conditions of travelling by rail were such that it failed to complete its transformation, but remained alive within the exuvia long enough to develop the colour-pattern quite distinctly. This is easily recognizable as belonging to *interrupta*. The race found at Banff is *lineata* varying towards *interna*. Mr. C. H. Kennedy has also taken a similar form of this species in transformation in Nevada and California, and I have found numerous exuviæ on Vancouver Island under circumstances in which all other species were excluded. These exuviæ are all identical, and it is quite evident that the various races of this species do not differ from one another in the early stages. It seem therefore certain that the two nymphs in the Cabot collection, which I referred with considerable doubt to *A. interrupta lineata*, do not belong to this species. It is probable that they are somewhat atypical examples of *A. eremita*.

Æshna palmata Hagen.

During the summer of 1913 I reared a number of specimens of this species and obtained a large number of exuviæ. A study of this material shows that the two exuviæ referred to this species in my "North American Dragonflies of the Genus Aeshna" were correctly placed, but that some of the characters used to separate it from *A. umbrosa* are not valid.

I now possess a large series of exuviæ of both species, including several of *umbrosa* from Vancouver Island, where most of my nymphs of *palmata* were taken. I find that the two species at this stage are so much alike that in many cases it is a difficult matter to separate them with certainty. The form of the living nymph is probably invariably stouter in *palmata*, but this difference is often difficult to detect in preserved material, though usually evident enough, to the trained eye, in the exuviæ. The difference in the form of the labium is often but slight, but it seems to be always slightly broader at base in *palmata*. The absence of an internal apical tooth on the lateral lobes, employed by me as a differential character for this species (N. Am. Aeshna, pp. 68, 162), is a mere individual variation. The tooth is normally present as in *umbrosa*. The differential based upon the supra-coxal processes seems to be constant and is certainly a useful character. The posterior process is always the stouter and often the longer in *umbrosa*, while in *palmata* they are equal or very nearly so, the anterior being sometimes the larger (pl. XXV, figs. 4-5).

The ovipositor is slightly larger in *palmata* and extends slightly beyond the hind margin of segment 9, but seldom covers as much as one-third of segment 10 as given in the key. In *umbrosa* it just reaches the margin.

These differences in width of labium and abdominal segments and in length of ovipositor will be best appreciated by referring to the following table, which is based upon three males and three females of each species, taken at random. The first three of each species are males. The length of these specimens is nearly the same throughout the series. The relative size is roughly indicated by the lengths of the hind femora.

Aeshna palmata.

Locality	Hind. Fem. Length	Mentum of Labium			Seg. 3 Width	Seg. 7 Width	Seg. 9 Width	Ovipos Width
		Length	Bas. Width	Mid. Width	Ap. Width				
Banff (reared)	6.7	6.0	2.5	3.2	4.75	5.0	7.5	5.8	...
Vanc. I. (reared)...	7.0	6.4	2.5	3.2	4.7	4.8	7.0	5.6	...
Vanc. I.....	7.5	6.6	2.7	3.3	4.9	5.0	7.8	6.2	...
Vanc. I. (reared)...	7.3	6.8	2.6	3.5	4.8	4.6	7.3	6.0	3.3
Vanc. I.....	7.0	6.5	2.6	3.5	4.9	4.8	7.5	6.1	3.2
Vanc. I.....	7.5	6.8	2.6	3.5	5.0	4.9	7.3	6.0	3.5
Average.....	7.16	6.51	2.59	3.36	4.84	4.85	7.40	5.95	3.33

Aeshna umbrosa.

Georg. Bay (reared)	6.7	6.6	2.3	3.0	4.4	4.5	7.0	5.0	...
Toronto.....	7.0	7.0	2.3	3.2	4.75	3.7	6.7	5.1	...
Toronto.....	7.3	7.0	2.3	3.2	4.9	4.4	6.3	5.25	...
Toronto.....	6.6	6.8	2.3	3.0	4.6	4.6	7.0	5.0	2.8
Georg. Bay (reared)	6.5	6.9	2.2	3.0	4.3	4.75	6.5	5.0	2.8
Vanc. I. (reared)...	7.0	6.6	2.25	2.9	4.5	4.2	6.0	5.1	2.6
Average.....	6.85	6.81	2.27	3.05	4.57	4.36	6.58	5.07	2.73

It will be seen that the length of the hind femora and of the mentum of the labium is about the same in the two species, but that in the other measurements, particularly the length of the ovipositor, *palmata* has somewhat the advantage. The measurements of segment 3 are less reliable than those of segments 7 and 9, as the form of this segment varies considerably in the exuviæ.

Ecologically there is quite a marked difference between these species. *Umbrosa* is everywhere an inhabitant of small streams, while *palmata* lives in pools and small ponds. I found nymphs of *umbrosa* associated with those of *Cordulegaster dorsalis* in a small forest brook near the Biological Station on Vancouver Island, *palmata* being entirely absent from this stream. About two miles from this spot was a small pool in the woods, grown up with western Skunk Cabbage. This pool contained numerous nymphs of *palmata*, but no other Aeshna.

Sympetrum pallipes Hagen.

We found this species in abundance on Vancouver Island

during the second half of July, and in August, 1913, and obtained plenty of the nymphs from two or three small ponds at Rock City, a village near the Biological Station. From these a number of adults emerged on July 20 and 21.

Most of the adults taken have the legs entirely or almost entirely black and agree with Ris's description of *S. obtrusum morrisoni*. They intergrade, however, with pale-legged specimens and are undoubtedly conspecific with *S. pallipes*, as Ris himself suspected. But I cannot consider them as a variety of *obtrusum*, for, in the first place, I found both *pallipes* and typical *obtrusum*, in every respect like eastern specimens, at Okanagan Landing, B. C., on the Pacific Slope, while *pallipes* ranges eastward to Waterton, Alta., In the second place, the nymphs of *pallipes* are quite distinct from those of *obtrusum*, but are so extremely like those of *costiferum* as to be practically indistinguishable from that species. I have neglected to rear *S. obtrusum* and have no nymphs that I can refer to it with certainty, but I have a number of *S. rubicundulum*, which Professor Needham was unable to distinguish from *obtrusum*, and they are very easily separated from *pallipes*.

The nymphs of *pallipes* like those of *rubicundulum* frequent small stagnant pools or ditches, while *costiferum* seems to prefer shallow reed-grown parts of ponds or lakes.

Nymph (pl. XXV, figs. 6-8).—Eyes moderately prominent, lateral margins of head very oblique, passing into the posterior margins without any semblance of an angle. Mentum of labium narrow at base, the basal breadth being somewhat less than one-fourth the greatest breadth, which is almost equal to the length; sides moderately concavely curved, diverging in the distal fourth at an angle of about 90°, median lobe depressed at an angle of about 30° with the general surface of the mentum. Mental setæ 13-14, the 4th or 5th from the side longest. Lateral setæ 10-11. Movable hook slender, one-fourth to nearly one-third as long as the distal margin of the lateral lobe, the latter with very low crenulations, at the intervals between which are groups of 3 (sometimes a rudimentary fourth in some of the groups) successively longer setæ, the third much longer than the other two (see fig. 8).

Abdomen widening gradually from base to segment 6, narrowing more rapidly caudad, especially on segments 9 and 10. Dorsal

hooks on segments 4-8, straight, or but slightly curved, rudimentary on 4, increasing to 7, on which the hook is almost as long as the segment; lateral spines on 8 and 9, on 8 about one-fourth (measured on the inner margin) as long as the lateral margin of the segment (without spine); on 9 about one-third to one-half as long as the lateral margin, not quite reaching the level of the ends of the lateral appendages, which are about two-thirds as long as the superior appendage, and slightly more than one-third as long as the inferior appendages. Superior appendage slightly longer than broad; both superior and inferior appendages acuminate, terminating in very slender apices.

Colour greenish brown, with rather obscure dark markings. Thorax with a dark longitudinal band on the pleura; femora dark, with two pale annuli, a median and an anteapical; tibiæ also with two pale annuli separated by a median dark annulus.

Length of body 16-18; outer wing-pad 5-6; hind femur 4.6-5; width of head 4.5-4. 9; width of abdomen 5. 5-6.

As already stated, the nymphs of *pallipes* and *costiferum* are practically indistinguishable. The only differences I could find are the slightly greater basal width of the mentum of the labium in *costiferum* and in the spines on the distal margin of the lateral lobes of the labium, which in *costiferum* are usually single or with only one additional rudimentary spinule.

Leucorrhinia hudsonica Selys.

On June 18-20 adults of this species were found in considerable numbers at Nipigon, Ont., where they were associated with *L. glacialis*, although much more numerous. No other Libellulines were as yet abroad, the only other Anisopterous dragonfly being *Cordulia shurtleffi*. Both *L. glacialis* and *C. shurtleffi* were transforming in the marshy borders of the Nipigon River, but careful search failed to result in the finding of a single nymph or transforming imago of *L. hudsonica*. Two exuviæ were found, however, which can belong to no other species.

Nymph (pl. XXV, figs. 9-12).—Similar in form and size to *L. frigida;* head similar, but the eyes somewhat less prominent, more as in *intacta* (see Canadian Entomologist, 45, 1913, pl. 2, figs. 20, 23); rear of head with numerous

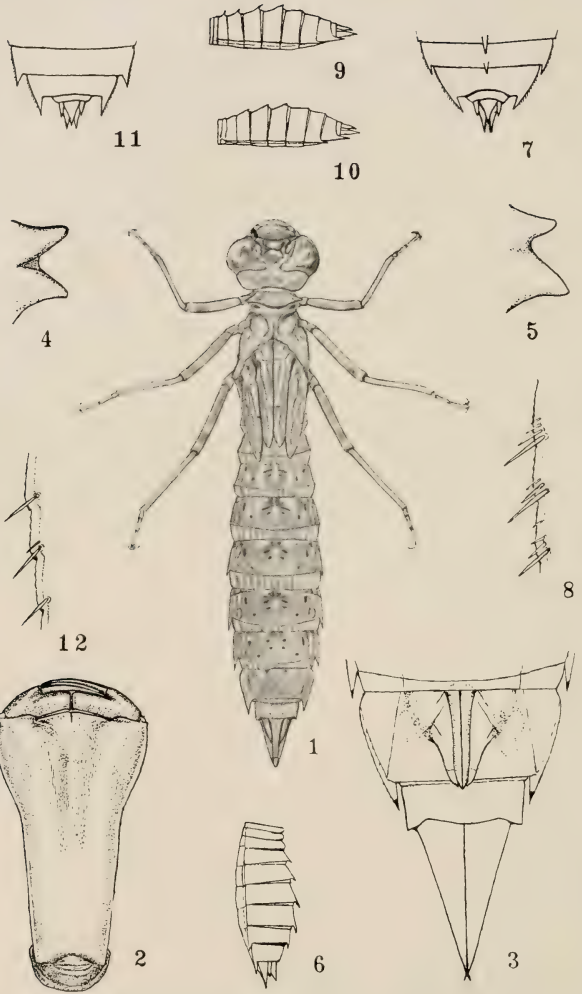
long hairs. Mentum of labium almost as broad distally as long; sides nearly straight on the proximal two-thirds, thence bending outwards so as to be rectangularly divergent. Ventral surface in the proximal two-thirds somewhat longitudinally convex; median lobe depressed at an angle of about 30°; apex but little rounded. Mental setæ 12-14; the third to the fifth from the outside longest. Lateral setæ 9 or 10; movable hook slender, nearly half as long as distal margin of lateral lobes, the latter slightly undulate, the spines single or, here and there, a pair, of which the upper is much shorter than the lower; there may be also a third very rudimentary spinule on the opposite side of the long spine (fig. 12).

Abdomen, as in other species of the genus, broad-ovate, widest at segment 6, narrowed almost equally toward apex and base. Dorsal hooks on segments 3 or 4 to 6, vestigial, longest on 5. In one specimen they are considerably better developed than in the other, there being quite a distinct hook on segment 3, while in the other there is no trace of a hook on this segment. In the former the hook on 5 reaches the hind margin of the segment, in the latter it does not nearly reach the margin. Lateral spines on 8 about two-fifths the length of the segment, slightly divergent; spines on 9 about three-fifths the length of the segment, reaching to the level of the apex of the lateral appendages, their inner margins parallel; superior appendage about three-fourths as broad at base as long, sides nearly straight, apex acuminate, slender, somewhat decurved; lateral appendages rather stout, but tapering rather abruptly to fine-pointed apices, about three-fifths as long as the superior appendage and half as long as the inferior appendages, which project a little beyond the former. The setæ on their inner surfaces are longer and coarser than in *L. frigida*.

Colour dull brownish above with faint indications of mottling, but no distinct pattern. Legs apparently without distinct annuli. Under surface of abdomen with three conspicuous, dark brown, longitudinal bands.

Length of body 17-17.5; outer wing-pad 5.3-5.5; hind femur 4.3-4.4; width of head 5-5.2; width of abdomen 6-6.2.

These nymphs differ from the form described by Needham as belonging to *L. frigida* only in the presence of vestigial dorsal hooks, which in Needham's specimens are wholly lacking. I have a



NYMPHS OF CANADIAN ODONATA.

number of specimens identical with Needham's form from Go Home Bay, Georgian Bay, Ont. (date and collector unknown) and two exuviæ, received from Mr. C. H. Kennedy, form Lake McKinney Tahoe, California. I feel confident that they all belong to *hudsonica*, in spite of these differences in the development of the dorsal hooks. There is no other species in the Georgian Bay region which this nymph could fit. *Leucorrhinia proxima* is the only species which could be considered, but it is much larger than *hudsonica*, whereas these nymphs are all of about the same size.

Explanation of Plate XXV.

Figs. 1-3.—*Æshna tuberculifera;* 1, female nymph (x2); 2, labium; 3, terminal segments and genitalia of female nymph.

Fig. 4.—*Æshna palmata*, right supra-coxal processes.

Fig. 5.—*Æshna umbrosa*, right supra-coxal processes.

Figs. 6-8.—*Sympetrum pallipes;* 6, lateral view of abdomen; 7, dorsal view of terminal segments; 8, portion of distal margin of lateral lobe of labium.

Figs. 9-12.—*Leucorrhinia hudsonica;* 9, lateral view of abdomen of exuvia from Nipigon, Ont.; 10, same, from another Nipigon specimen; 11, dorsal view of terminal segments; 12, portion of distal margin of lateral lobe of labium.

NOMENCLATURAL AND CRITICAL NOTES ON HEMIPTERA.

BY E. P. VAN DUZEE, LA JOLLA, CALIF.

For the past two years, as many of my correspondents know, I have devoted all my spare moments, which have been all too few, to the preparation of a catalogue of the North American Hemiptera. This is now practically completed, but as it is not certain just when it will be in print, it seems best to call attention in advance to certain features of the nomenclature used, partly in the hope that criticism may show oversights and errors in time for correction in the manuscript.

The following synonymy calls for special mention:

Genus **Cydnus**.—When founding this genus, Fabricius designated *tristis* (= *aterrimus* Forst.) as type. *Cydnus* must therefore

replace *Brachypelta* Am. & Serv., which has the same type and the *Cydnus* of Fieber, Signoret, and Lethierry and Sevrin becomes *Aethus* Dall. with *indicus* Westw. as type.

Subfamily **Asopinæ**.—The synonymy of genus *Asopus* Burm. is complicated by an uncertainty as to where it was first published. Kirkaldy claims that it first appeared in Silbermann's Revue, and therefore names *gibbus* Burm. (=*cayemensis* Lap.) as type, thus making it synonymous with *Discocera* Lap., but Dr. Bergroth in 1911 (Wien. Ent. Zeit., XXX, p. 122) gives us a careful study of the question, and concludes that we should accept *argus* Fabr. (= malabaricus Fabr.) as the type of *Asopus*, and I do not see that we can do better than to follow him. Where we cannot be certain which of two names appeared first, it would seem best to accept the one which least disturbs a long accepted synonymy and gives us the most rational interpretation of the author's meaning. By adopting the above synonymy we are able to retain the well-known subfamily name *Asopinæ*.

Genus **Perillus** Stal.—This genus was founded in 1862 as a subgenus of *Oplomus* with the species *confluens* H. Sch., *virgatus* Stal, and *circumcinctus* Stal, of which *confluens* has properly been selected as type. I can see no justification for Schouteden's new genus *Perilloides*, as it possesses no workable character except the greater convexity of the pronotum, and I have not recognized it in my catalogue. The sulcation of the tibiæ differs inappreciably, if at all, in the two genera.

Genus **Acanthocephala** Lap.—The names *Diactor* Burm. and *Metapodius* Westw. were both given as substitutes for *Acanthocephala* Lap., a name supposed at that time to be preoccupied by a family of that name in the Vermes. By the International Rules a family name cannot preoccupy a generic name and *Acanthocephala* is therefore valid. *Metapodius* has the same type as *Acanthocephala*, and cannot therefore be used as a distinct subgenus as was done by Stal, and we must fall back on *Metapodiessa*, substituted by Kirkaldy for this well-known North American subgenus.

Genus **Leptocorisa** Latr.—So many changes have been made in this genus that a word of explanation seems necessary. Latreille

founded the genus *Myodocha* in 1807 with a fair description and named three species; *tipuloides* (a *Leptocorisa*), *trispinosa* (a *Cydamus*), and *fulvipes* (an *Ischnodemus*), but as his generic diagnosis in no way fits any one of these species, it becomes evident that his manuscript must have been mixed and the genus becomes invalid here. In 1810 he corrects this error and names *serripes* as type of *Myodocha*, but as this species was then undescribed, the genus is still invalid, but becomes of force the following year, when Oliver describes it as *Myodochus* and gives a recognizable description of *serripes*. Leach, in 1815, names *tipuloides* as type of *Myodocha*, and is followed in this by Burmeister and Kirkaldy, but this is obviously invalid. The name *Leptocorisa* first appears as *Leptocorise* in 1825 (Latreille, Fam. Nat. Reg. Anim., p. 421) as a nomen nudum and not in a Latin form. In 1827 Berthold, in his German translation of Latreille's work, changes the French form to *Leptocorixa*, but does not describe the genus nor mention a species, so it is still a nomen nudum. In the 1829 edition of Cuvier's Regnum Animalia Latreille first characterizes the genus making it equivalent to *Gerris* Fabr. (of the Syst. Rhyng.), except *vagabundus*, but does not state that it is a substitute for that name so it need not have the same type. Laporte in 1832 names his *linearis* (= *filiformis* Fabr.) as type, which, being an original species, is valid and must stand.

Genus **Corizus** Fall.—Brullé, 1835, first fixes the type of *Corizus* as *hyoscyami* Linn., and Westwood in 1840 fixes that of *Rhopalus* Schill. as *capitatus* Wolff (= *subrufus* Gmel.). The former is equivalent to *Therapha* Am. & Serv. and the latter is the *Rhopalus* of Stal and the *Corizus* of the Oshanin Katalog. As subgenera, neither are found in our fauna.

Genus **Leptocoris** Hahn.—On account of the close resemblance of this name to *Leptocorisa* Latr. it has been renamed three times, and in each case the name was given as a straight substitute for the supposedly preoccupied *Leptocorisa*, and must take the same type. These names are *Serinetha* Spin., *Lygæomorphus* Blanch., and *Pyrrhotes* Westw. *Leptocoris* is valid and must stand for this genus, and the tribe becomes *Leptocorini*, not *Serithini*. Kirkaldy, in Proc. Hawaiian Ent. Soc., vol. II, p. 123, 1910, has established a new subgenus of *Leptocoris* as *Boisea*. He founds it in but few

words on colour characters and a "slight margination of the pronotum, etc.," for "*vittata*." The only *vittata* in this genus is already the type of the synonymic genus *Tynotoma* Am. & Serv. Both his new subgenus and his species "*vittata*" are absolutely unrecognizable, except as we may assume that his disconnected remark concerning an American species of *Leptocoris* may refer to this, and thus identify his "*vittata*" with *trivittata* Say. Kirkaldy was very severe in his criticisms of others for the use of colour characters and incomplete descriptions, but no one used colour characters more or gave us more fragmentary and unrecognizable descriptions. It is greatly to be hoped that some competent Hemipterist will work out Kirkaldy's oriental genera and species while the types are still available and thus locate, and I might say validate them, for us.

Genus **Neides** Latr.—Latreille founded *Neides* in 1802 with two species, *tipularius* and *clavipes*, and in 1810 named *tipularius* as its type. Fabricius founded *Berytus* in 1803, and then named *tipularius* as its type. I can see no reason why these genera should not be considered strictly identical and every writer so far as I can learn so considered them until 1860, when Flor divided the genus, placing *clavipes* in *Neides*, founding *Sphalerocoris* for *tipuloides* and restricting *Berytus* to *rufescens*. Fieber the next year retains *Neides* for *tipularius* and its allies, and *Berytus* for *clavipes* and its allies, in which he is followed by Puton (1886), Lethierry and Sevrin (1894), and Oshanin (1906 and 1912). Reuter (1888), on the contrary, places *tipularius* as the type of *Berytus* and *clavipes* as the type of *Neides*, and in this is followed by Bergroth in 1906. I believe Kirkaldy was entirely right in considering these genera as homotypical and that he was justified in renaming *Berytus* Fieb. as *Berytinus*. The family thus becomes *Neididæ*, not *Berytidæ*. Most European Hemipterists seem to have overlooked genus *Podicerus* Dumeril founded in 1824 with *tipularius* as type. In the Journal of the New York Entomological Society for 1911 (Vol. XIX, p. 24), Mr. H. G. Barber places my *Jalysus perclavatus* as a synonym of *Hoplinus multispinus* Ashmead, and suggests that my redescription of the species was owing to the poor characterization of Ashmead's species. This, however, does not fully state the case. The difficulty here is that Ashmead's description does

not at all correspond with his supposed type now in the National Museum. I did in this case as I have always done, followed the description rather than the supposed type. It is inconceivable that any one who pretends to know anything about the Hemiptera would describe a *Jalysus* with unarmed connexivum and pronotum and membranous elytra in a genus belonging to a distinct subfamily and having the connexivum and pronotum long-spinose and the corium coriaceous and punctate. Ashmead also distinctly describes the head as trispinose. Characters omitted may be charged to an oversight, but non-existent structural characters cannot be added. His name *multispinus* could hardly apply to any *Jalysus*. I fail to see how the ends of science can be advanced by trying to connect Ashmead's description with his supposed type, and in my catalogue I have retained my species, leaving Ashmead's as a still unknown species of *Hoplinus*. Mr. Barber also sinks my *Jalysus wickhami* as a straight synonym of *spinosus*. It, however, readily separates out as the western form of *spinosus*. The typical form of this species I have not seen from west of the Rocky Mts., although in Texas the two seem to intergrade and may do so wherever their habitats overlap.

Genus **Lygaeus** Fabr.—This genus was founded by Fabricius in 1794 to include a heterogeneous assemblage of species that he could not satisfactorily locate in his other genera, or so it looks to us. Lamarck in 1801 named *equestris* as its type, and in 1803 Fabricius indicates *tenebrosus* as the typical species. Kirkaldy and others claim that his repeating the generic characters in his description of *valgus* in 1794, but without italics, was a valid naming of the type. An argument in favour of this is found in the fact that he did not repeat these type indications in the case of two of the five genera so distinguished in his Systema Rhyngotorum, but in *Lygœus* and one other genus he has indicated a different species as type in his later work, which in a measure will offset Kirkaldy's contention. In these two cases of double type-fixation, if such they be called, I think we should ignore both and take the next valid fixation, which in the case of *Lygœus* is *equestris*, and in the case of *Gerris*, the other genus referred to, is *lacustris*. This procedure, which I believe is perfectly justifiable and logical, conserves these names for the genera as almost universally used

since the time of Latreille, and in the case of *Lygæus* makes that genus synonymous with *Graptolomus* Stal and *Eulygæus* Reuter. Most European entomologists accept Laporte's indication of *familiaris* Fabr. as type of *Lygæus* or follow Kirkaldy in considering *Lygæus* a Coreid genus with *valgus* as type, but I think the solution here given much more reasonable and better in every way.

Genus **Artheneis** Spin.—Dr. Horvath (Ann. Mus. Nat. Hung., VIII, p. 11, 1910) has shown conclusively that the type of this genus should be *foveolata* Spin. Kirkaldy had no reason to name *cymoides* as type and thus to make this genus supercede *Nysius* of Dallas.

Genus **Perigenes** Dist.—I have examined a long series of *Perigenes constrictus* Say from the Northern and Middle States, and have been unable to detect a distinct lunate vitta on the venter of any, although there is a structural fullness at that point which in rubbed specimens has somewhat the aspect of a vitta. The southern specimens sent to me as *Ligyrocoris constrictus* Say have proved to be *abdominalis* Guer. Say's species as represented in the collection of the Boston Society of Natural History is an undoubted *Perigenes*. It is questionable whether this lunate vitta should be considered as a generic character, as genus *Ligyrocoris* as now constituted contains species of at least four genera: *Sphærobius*, *Heræus*, *Orthæa*, and *Perigenes*, and separable therefrom only by this lunate vitta. In my catalogue I have been unable to quote a number of the locality records on account of the mixing of the species.

Genus **Orthæa** Dall.—Say's name *Pamera*, used by Stal for this genus, published in 1832 as a straight substitute for the preoccupied *Pachymerus* Lep. & Serv., a palæarctic genus. The same year Laporte published the name *Arphanus* as a substitute for this same preoccupied name. I know no way to determine for certain which of these works appeared first and personally prefer to use the name *Aphanus* for two reasons: Laporte's paper was a systematic work in which the author undertook to name a type for each of the Heteropterous genera known to him and for this genus he names *rolandi* Linn., which was one of the original species and a perfectly valid type fixation. Say's work was a

faunal paper, and as he names no type nor original species, his name must follow the first valid type fixation for genus *Pachymerus*, which was that of Laporte mentioned above. A further and strong reason for accepting Laporte's name is that Say's name *Pamera* has long been used for a quite distinct assemblage of species, and the transfer of the name would cause serious confusion. It may be well to add here that while Say's paper on the Heteropterous Hemiptera was dated 1831, only the first eight pages were published that year as we are informed by Fitch (2d Annual Rept. N. Y. St. Entomologist, in Trans. N. Y. St. Agricul. Soc., Vol. XV, for 1855, p. 523). The next name quoted by Stal for *Pachymerus* is *Stenocorius* Ramb., which is equivalent to *Paromius* Fieb. It was established in 1842, not 1838 as cited by Stal, and is preoccupied by *Stenocoris* Burm. published in the supplement to the Handbuch, Vol. II, part 2, p. 1010, 1838. This leaves *Orlhæa* Dall. the first valid name for the genus with *consuta* Dall. as type. It may be noted in this connection that the genera *Calyptonotus* and *Aphanus* in the Oshanin Katalog must be reversed. The name *Calyptonotus* Dougl. and Scott was published as a substitute for *Rhyparochromus* Fieb. (and Am. & Serv.) and therefore takes as type *alboacuminatus* Goeze. I cannot find that this genus is represented in our fauna.

Genus **Astemma** Lep. and Serv.—This genus was founded simultaneously by Latreille and Lepeletier and Serville in 1825. Latreille's genus was without description or species and consequently was a nomen nudum until 1829, when in the edition of Cuvier's Regnum Animalia of that year he gives it a short diagnosis and names two species: *Salda pallicornis* and *flavipes* of Fabricius, the latter a *Geocoris* not answering to Latreille's diagnosis of his genus, so the former must be taken as the type making it equivalent to *Halticus* Hahn, 1831. Lepeletier and Serville founded their genus *Astemma* in the tenth volume of the Encyclopia Methodique, naming several species and describing *cornuta* as new. In 1832 Laporte designates *königi* Fabr. as the type of *Astemma*, but not being an original species, this type fixation is invalid. Kirkaldy in 1909 names *apterus* Linn. as type of the *Astemma* of Lep. & Serv., but this certainly is invalid, as Stal had in 1870 restricted the genus to *cornuta* and its allies, as he

had a perfect right to do, and thus making it a valid genus related to *Largus*, with *cornuta* as type.

Genus **Phymata** Latr.—I wish to call attention here to the fact that Handlirsch in his monograph on this genus has, perhaps inadvertently, renamed the typical subspecies of *Phymata erosa* as *linnei* Handl. Under the International Code it must be known as *Phymata erosa erosa* Linn. with *linnei* as a synonym. It also seems to me unquestionable that Stal was right in assigning Wolff's description and figure of *erosa* to our northern form which he renames *wolffi* and of which subspecies *pennsylvanica* Handl. is a straight synonym. Subspecies *fasciata* Gray is undoubtedly the southern form included doubtfully by Stal under *wolffi*. Subspecies *fasciata* Stal has been rightfully renamed by Handlirsch, who calls it *communis*, assuming that he has correctly located it. I am unable to understand why subspecies *chilensis* Handl. should not be known as *carinata* Fabr., but as this form is from outside our territory, I will leave this for others to work out.

Genus **Reduvius** Fabr.—This genus was founded by Fabricius in 1775 without designation of type. In 1801 Lamarck names *personatus* Linn. as such type, a valid type-fixation having priority over Fabricius' designation of *fuscipes* in 1803. While Stal was wrong in accepting *fuscipes* as type of *Reduvius*, he was certainly right in using *angulosus* Lep. & Serv. as the type of *Harpactor* Lap., who distinctly names that species as type when founding the genus. For the large genus *Reduvius* of Stal and Lethierry and Servin (= Harpactor of Am. & Serv.) we must use the name *Rhynocoris* Hahn, 1834, with *cruentus* Fabr. (= *iracundus* Poda) as the type. Our American species belong to this last genus. Of the numerous subgenera used by Stal in this genus, I would recognize but four or five, reducing the others to synonymy. The subfamily *Reduviina* of Stal, 1872, must take the name *Harpactorinæ*, as that was the first name given to the group. It has been so used by Amyot & Serville, Spinola, Dohrn, Puton, Lethierry and Servin, Champion and Oshanin. There are two fairly well marked tribes in this subfamily, the *Harpactocorini* with the mesopleura tuberculate and the *Zelini* without the mesopleural tubercle. The former was named *Hezeda* by Stal in 1859, but as I understand the International Code the typical subfamily

or tribe must bear the name of the typical genus the same as a subgenus, including the typical species of the genus must bear the name of the genus. The second tribe was called *Reduviida* by Stal, but has been properly designated as *Zelini* by Bergroth and others.

Genus **Ectrichodia** Lep. & Serv.—Kirkaldy (Entomologist, XXXIII, p. 239, 1900) goes into an elaborate explanation of why he names *Reduvius cruciatus* Lep. & Serv. as type of *Ectrichodia*, all of which was quite unnecessary as Laporte had already named this species as its type (Essai, p. 7, 1832) and Brullé did the same in 1835 (p. 320). This generic name must therefore replace the old-world genus *Physorhynchus* Am. & Serv. and *Ectrichodia* of Stal must be known as *Rhiginia* Stal with *lateralis* Lep. & Serv. as type. The name of our northern *cruciata* Say, described as a *Petalocheirus*, is not preoccupied by *Ectrichodia cruciata* Lep. & Serv. and will stand as *Rhiginia cruciata* Say.

Genus **Nabis** Latr.—This genus was founded by Latreille in 1802 with two species mentioned, *guttula* and *vagans* Fabr., the latter a synonym of *ferus* Linn. I cannot find that the former was named as type until Kirkaldy did so in 1900. *Vagans* was named as type of *Nabis* by Westwood in 1840, and I cannot see why this type fixation is not valid. *Reduvius apterus* Fabr. was named as type by Latreille in 1810, Laporte in 1832, and Spinola in 1837, but is invalid as *apterus* is not an original species. Latreille in 1804 and 1807 named *apetrus* (= *subapterus*) and *guttula* as examples, but this cannot be considered as a proper type fixation for *guttula*. *Nabis* then = *Coriscus* Auct., = *Reduviolus* Kirby, with type *vagans* = *ferus* Linn. Prostemma Lap. = *Nabis* Stal, 1873, and Reuter, 1908 and 1909, type *guttula* Fabr.

Genus **Cimex** Linn.—This generic name is now so universally used for the "bed-bug" that it seems unnecessary to notice it here further than to draw attention to the fact that Kirkaldy's very positive statements that *Cimex* was not and could never be available for *lectularius* were founded on a careless and imperfect knowledge of the bibliography of this genus and species. Brünnich restricted genus *Cimex* to *lectularius* eleven years before Fabricius founded genus *Acanthia* and restricted *Cimex* to the *Pentatomidæ*,

and furthermore Lamarck named *lectularius* as type two years before Fabricius indicated *rufipes* as type of *Cimex*, so I cannot see that there is any case for discussion. My copy of both Brünnich and Lamarck are from the Kirkaldy library, and are annotated by him, and he could soon have learned these facts had he tried.

Family **Capsidæ**.—It seems to be quite the vogue now to follow Kirkaldy and call this family after the oldest genus, *Miridæ*. This Kirkaldy system is illogical to me as I have stated above, and I would not revert to it did it not seem best to refute Reuter's statement of 1910 that the name *Miridæ* Brullé, 1835, has priority over *Capsidæ* Burm., 1835. In the first place every indication I can discover of the date of these two works show that Burmeister's appeared first, but that would not effect the present case as Brullé's name was in the French form and was not latinized at all. If we accept vulgar names, we must go back to Hahn's Wanzenartigen Insecten, Vol. I, 1831, where we find the family called *Mirides*. However, I think Dr. Horvath was perfectly right in discarding all names not given in the Latin form. By this system the name *Capsidæ* has clear priority and practically universal usage until Kirkaldy devised his system for unstabilizing family nomenclature.

Genus **Salda** Fabr.—This genus cannot be considered without first locating *Acanthia*. Fabricius founded *Acanthia* in 1775 for *lectularius* and its allies without indication of type. Latreille in the "Precis," 1796, restricts *Acanthia* to those of Fabricius' species which inhabit the borders of ponds and streams, but names no species nor type. As it is impossible to name a type from such a statement, his restriction has no value. In 1801 Lamarck identifies *Acanthia* with *Cimex* and names *lectularius* as type. The next year Latreille still clings to his delusion and describes genus *Acanthia* for *littoralis* and *zosteræ* Fabr. One year later Fabricius, perhaps as a protest against Latreille's misuse of his genus, restricts *Acanthia* to *lectularius* and *hemipterus* and indicates the former as its type. At the same time he founds his genus *Salda* for the littoral forms with *zosteræ* as type. This disposition of these species by Fabricius was perfectly valid, and I have so used them in my catalogue. Recently Dr. Reuter has broken up genus *Salda*, very properly restricting *Salda* to *zosteræ* and its allies, but still retains *Acanthia* for the littoral species with *saltatoria* Linn. as type. In accepting

Acanthia in the Fabrician sense as indicated above we find the largest genus in the family without a name and I therefore propose to call it **Saldula**. As a substitute for *Acanthia* of Reuter (Of. Finska Vet. Soc. Forh., Afd. A, No. 12, p. 14, 1912) it takes the same type, *saltatoria* Linn. Nineteen North American species belong to this genus.

Genus **Dictyophara** Germ.—Melichar in his recent monograph on this subfamily places our American species in Stal's genus *Nersia*, which he considers as distinct. Our species are, however, entirely congeneric with *Dictyophara europæa* Linn. and must be retained in this genus.

Genus **Ticida** Uhler.—I now find that my *Loxophora transversa* is a synonym of *Ticida cingulata* Uhler and my genus therefore becomes a synonym of *Ticida*. I was mislead by Uhler's placing his genus in the *Issidæ*.

Genus **Otiocerus** Kirby.—I do not accept Kirkaldy's statement that Vol. XIII of the Trans. of the Linnean Society was published in 1822. The first pages containing Kirby's paper undoubtedly appeared in 1819 or very early in 1820. Germar accepted Kirby's name as the earlier and we must do the same.

Genus **Cicada** Linn—When publishing my note on this genus in 1912 I did not realize that it was Lamarck's intention to name types in this work of 1801, and finding *Cicada* without a valid type, named *tibicen* as such type. There is no doubt, however, but we must accept *orni* Linn as type of *Cicada* as named by Lamarck, thus making the genus equivalent to *Tettigia* of Kolenati. There is an additional reason for our doing this in the fact that Linneus named this section of his genus *Manniferæ* from the "manna" produced by this insect, which is perhaps the most common European *Cicada*. This is in accord with the Linnean method of restricting his genera to the best known or officinal species. What then shall we do with genus *Cicada* of Stal and other writers? Latreille in 1825 establishes genus *Tibicen* for *plebeja* Scop., but without description. The question is: Was *Tibicen* properly established by the simple naming of a well-known species in 1825, or must it be held over until 1829, when one distinguishing character (of no value) was given and four species (belonging to three genera)

are named? Amyot and Serville take the latter view and name *hæmatodes* as its type. The genus can, however, be much more accurately recognized by the naming of *plebeja* in 1825 than by the characters and species mentioned in 1829, and I think we should accept *plebeja* as its type. Many recent writers ignore *Tibicen* entirely, but this cannot be done. Either it is equivalent to the *Cicada* of Stal with *plebeja* as type or *Tibicina* Kolen. with *hæmatodes* as type. Another question arises in studying this case. Fabricius, who uses *Tettigonia* Geoff. in place of *Cicada* Linn. indicates *tibicen* as its type, and I am not certain but we should consider this a valid naming of a type for genus *Cicada* of Linn. This, of course, would antedate Latreille's genus *Tibicen* and leave genus *Cicada* as it was understood before Distant founded his genus *Rihana*. I can find no ruling on this in the International Code, and therfore for the present use *Cicada* for *orni*, largely on the assumption that Linneus intended that for the type of his section *Manniferæ*, and *Tibicen* for *plebeja*. Latreille in 1810 names *plebeja* as type of genus *Cicada* Linn., but as it was not an original species, this is of course invalid.

Genus **Philænus** Stal.—As I understand the International Rules, a variety name is preoccupied by an earlier species name in the same genus. This necessitates our changing the name of *Philænus leucophthalmus* var. *lineatus* Linn. for which I now propose the name *fabricii*; and we must also change the name of what was formerly the typical *spumarius* of Fallen ,which I propose to call *falleni*. Both of these colour varieties occur in our fauna.

Genus **Ceresa** Am. & Serv.—The name *aculeata* was used in this genus by Fairmaire in 1846, so I now propose the name **stimulea** for the *Ceresa aculeata* published by me in 1909.

Genus **Stictocephala** Stal.—I cannot find that a type has been named for this genus, so I now name *lutea* Walk as such type, as it is the best known species mentioned by Stal when founding the genus.

Genus **Campylenchia** Stal.—I do not feel at all convinced that our North American *latipes* Say is identical with the South American *curvata* Fabr. and have retained it as distinct in my catalogue.

Genus **Bolbonota** Am. & Serv.—Fowler's name *aureosericea* preoccupied in this genus by *aureosericea* Stal, and for the former I propose the name **dubiosa.**

Genus **Gypona** Germ.—*Gypona bimaculata* Woodworth, 1887, is preoccupied by *Gypona bimaculata* Spangberg, 1878, for the former I propose the name **woodworthi.**

Genus **Euscelis** Brullé.—Genus *Athysanus* Burm., 1838, type *argentatus* Fabr., is scarcely separable from *Phrynomorphus* Curtis, 1833, type *lineolatus* Brullé. It seems, however, that both must fall before *Euscelis* Brullé, 1832, type *lineolatus* Brullé. I have not been able personally to examine Brullé's work, nor can I learn that there is a copy in this country, but he seems to have established his genus for *lineolatus*, and as his genus has recently been recognized by Dr. Horvath, it is evidently a valid genus, I recognize the following subgenera: *Athysanus* Burm., type *argentatus* Fabr., *Euscelis* Brullé, type *lineolatus* (= *Conosanus* Osb. and Ball), *Conomellus* Osb. and Ball, type *comma* Van D. and *Stirellus* Osb., and Ball, types *bicolor* Van D.

NOTES ON SCIAPUS, WITH DESCRIPTIONS OF THREE NEW SPECIES.

BY M. C. VAN DUZEE, BUFFALO, N. Y.

Sciapus forcipatus Ald.

Three males from Guatemala differ from Prof. Aldrich's description in having the knob of the halters, lamellæ of the hypopygium, and hind tibiæ yellow; and in having the wings marked with the usual two cross bands, although these bands are not very dark or well defined. The two long bristles at the tip of the abdomen seem to be composed of two or more fine hairs so closely twisted together as to appear as one, in one specimen these hairs are partly separated; the middle tibiæ have two long bristles, one at the middle and one at apical fourth; the middle tarsi in one specimen have two rather long bristles, and several smaller ones on the first joint; all the femora have long white hairs below, the middle pair have also the black bristles mentioned by Aldrich.

I feel quite certain that these differences are not of specific value; in fact, hardly sufficient to warrant separating it as a variety.

Two other males in the same lot have the hind tibiæ yellowish brown and the wings hardly tinged with brown, even in front of the third vein. They come nearer the typical form.

Sciapus tonsus Ald.

I have seen two specimens, one from Bradentown, Fla., and the other from Beaufort, N. C., which answer the description of this species. In one the appendages of the hypopygium are closely drawn up as in the type; in the other they are somewhat extended. They are black and rather long, extending forward to the tip of the fourth ventral segment. The fore metatarsi are about as long as the four remaining joints together, and with rather long hair below.

Sciapus crinitus Ald.

I took this at Bradentown, Fla., and have seen specimens from Georgia.

Sciapus flavipes Ald.

I took a number of these at Bradentown, Fla., in March. I have also seen specimens from Georgia and Erie Co., N. Y.

Sciapus chalybeus, n. sp.

Male—Length 5.5 mm. Face bare, green with blue reflections and coarse gray pollen on the lower part. Front blue-green, pure green on the upper lateral corners; antennæ black, with a few rather long bristles on the second joint, one of which is three-fourths as long as the face; arista more than half as long as the body and with the tip white. Thorax steel-blue or purplish; pleuræ more green; meta-scutellum green; bristles of the thorax and abdomen long. Abdomen concolorous with the thorax, the last two segments green. Hypopygium with a peduncle which is as long as the sixth segment, blue, and bears many long, wavy hairs, which are as long as the fifth and sixth segments together; hypopygium black with pale yellow, curved, somewhat forcipate appendages. Coxæ, trochanters and femora black; extreme tips of fore and middle femora, all tibiæ and fore and middle tarsi yellow; last joint of fore and middle tarsi, extreme tips of hind tibiæ and hind tarsi black; all femora with long white hairs below; fore tibiæ with a row of bristles on the upper surface, two of which are long, the last one about three-fourths as long as the tibiæ; fore tarsi a little more than twice the length of their tibiæ, the

first joint being longer than the remaining four together, and ciliate with long bristles above; the second joint with a long and the third joint with a short bristle at tip; middle tibiæ with three long bristles of increasing length above, and a long bristle-like spur at tip, also several small bristles; middle tarsi about one-and-one-fourth times as long as their tibiæ and ciliate above with close-set bristle-like hairs, which decrease in length but extend to the extreme tip of the fourth joint; fifth joint with minute white hairs above; hind tibiæ without bristles, but with a row of short hairs along the lower inner edge. Tegulæ and their cilia black; halters black, with a pale yellow knob. Wings grayish hyaline, with a brown cloud near the tip in front of the third vein.

Described from one male taken at Philadelphia, Pa. Type in the Cornell University collection.

The formation of the hypopygium and its appendages is much like that of *S. forcipatus* Ald., but the arrangement of the bristles of the legs is quite different and easily separate the species.

Sciapus digitatus, n. sp.

Male—Length 5 mm. Face and front green, the former with rather thick white pollen when viewed from in front, this pollen extending a little on to the lower part of the front; antennæ small, black, the longest bristles on the second joint a little longer than the antennæ; arista about as long as the width of the head; palpi and proboscis brown. Thorax green with very little pollen. Abdomen green, with black bands at the base of the segments, those on the last two segments occupying nearly the whole of the segments; hypopygium small with two small, slender, nearly straight appendages, which are black and about as long as the width of the hypopygium. Coxæ and femora black, the tips of the latter yellow; fore and middle tibiæ yellow; hind tibiæ yellowish brown with black tips; fore tarsi brownish almost from the base; middle and hind tarsi black; fore femora with delicate white hairs and a few black bristles below; fore tibiæ with about four long black bristles on the lower hind edge; fore tarsi about twice the length of their tibiæ, the metatarsi slightly longer than the tibiæ and with two bristles below; middle and hind femora with white hairs below; middle tibiæ with several small scattered bristles; hind tibiæ with only very short bristles, which are hardly distinguishable from the

hairs. Halters yellow, the stem infuscated; tegulæ and their cilia black. Wings hyaline, with the usual cross bands, which are united on the front as far back as the third vein; the last bend in the fourth vein nearly a right angle and little rounded.

Females with yellow femora.

Described from two males and two females from Cuba.

This is very close to *S. breviseta* Coq., differing in having longer bristles on the second joint of the antennæ, smaller lamellæ to the hypopygium and having the middle tarsi entirely black.

Sciapus nigrimanus, n. sp.

Male—Length 7 mm. Face green, more bluish on the upper part, white pollinose when viewed from above; front violet with the orbits narrowly green near the vertex. Antennæ small, black with short bristles on the second joint; arista about as long as the width of the head. Thorax green, white pollinose along the front and sides of the dorsum when viewed from above; pleuræ more blackish, with white pollen; scutellum blue-green. Abdomen green, with black bands at the incisures, that on the second segment extending forward on the centre of the dorsum to the base of the abdomen; hypopygium large with large, somewhat forked, black lamellæ. Coxæ black with white pollen; tips of the fore coxæ yellow; fore and middle coxæ with rather long, delicate white hairs on the front surface; hind coxæ with several pale hairs and the usual black bristle on the outer surface; femora green, fore and middle pairs broadly, and the hind pair narrowly yellow at the tips, all with delicate pale hairs below, those on the hind pair longest; tibiæ yellow, tips of the hind pair black; fore tibiæ with about six slender bristles below and one above near the apex; middle tibiæ with a row of about twelve stouter bristles on the lower front edge, three on the upper side, and three or four small ones on the posterior surface; hind tibiæ with one bristle at basal fourth; front tarsi black from the tip of the first joint, about one-and-two-thirds times as long as their tibiæ; the metatarsi nearly as long as the tibiæ, and with a row of bristles below extending the entire length; second joint short, about twice as long as wide with delicate hairs below, a little widened downward; third joint slightly shorter than the second; fourth joint nearly as long as the two preceding together; fifth joint about as long as the third; middle

tarsi black, the metatarsi a little shorter than their tibiæ and with a close row of erect hair-like bristles below; the remaining four joints together about two-fifths as long as the first; hind tarsi black, shining with rather long hairs, shorter than their tibiæ; the metatarsi longer than the remaining four joints together. Tegulæ yellowish brown, with black tips and cilia; halters yellow. Wings grayish hyaline, with the usual cross-bands, which are united in front as far back as the third vein; a brown cloud fills in the apex of the cell in front of the tip of the first vein; the cells between the first and third veins are tinged with yellow as far as the cross-bands; costa with erect cilia, which is longest at the tip of the first vein; the last section of the fourth vein beyond the fork bent backward so as to be somewhat U-shaped.

Female—Agrees with the male in the colour of the front, body and wings, but differs in having no rows of bristles on the tibiæ and tarsi and no erect cilia on the costa; the front coxæ and all femora are yellow, all the tarsi black, and the face is so thickly covered with white pollen as to conceal the ground colour. Length 6 mm.

Described from two males and three females taken at Los Amates and Marales, Guatemala, in February and March.

This species agrees in most points with the description of *S. genualis* Ald., but differs in the structure of the front tarsi, the first joint of which has a row of stout bristles below for its entire length, the second joint has no bristles, but only short, delicate hairs below, while Prof. Aldrich, in his description of *genualis*, states that the first joint has a few small bristles near the apex and the second joint a number of smaller ones extending its whole length.

FURTHER NOTES ON ALBERTA LEPIDOPTERA.

BY F. H. WOLLEY DOD, MIDNAPORE, ALTA.

(Continued from Vol. XLV., p. 302.)

531. *Diastictis denticulodes* Hulst.—A third specimen from Head of Pine Creek on Aug. 3rd, 1907.

534. *D. loricaria* Eversman.—Messrs. Barnes and McDunnough, in their "Contributions," Vol. I, No. IV, p. 33, and plate XV, figs. 5, 12, figure a winged female type of *Sympherta julia*

Hulst, from Hall Valley, Colo., and a Colorado male compared with a male type in their possession. The male there figured (fig. 12) is the species which was referred by Taylor to *loricaria* Eversman, and listed by me as such. The female type is, as Messrs. Barnes and McDunnough point out, a distinct species, and is very close to my No. 532, for which I have not yet received a name. No mention is made of sexes in Hulst's description.

541. *Apocheima rachelæ* Hulst. I have a wingless female taken here, which is evidently this species, dated April 11th.

543. *Anagoga pulveraria* Linn.—During one or two years, particularly 1909, this species was not uncommon here in June, flying at dusk in the poplar woods.

547. *Xanthotype crocataria* Fabr.—I have a single specimen of this species taken at the head of Pine Creek on July 14th, 1906.

552. *Euchloena astylusaria* Walk.—A male is in my collection taken at Edmonton by Mr. F. S. Carr, May 13th, 1910. A male at the head of Pine Creek on May 31st of the same year, by Mr. E. R. Brill. The latter specimen is about like Holland's figure, but lacks the cloud opposite the cell on primaries. The Edmonton specimen is similar though rubbed. The Red Deer River specimen previously recorded almost lacks the brown irroration, and differs from the others in having a diffuse transverse fuscous shade across all wings, above and beneath, least evident on the primaries above, where it is just posterior to the t. a. line. It is possibly a distinct species.

553. *E. pectinaria* Schiff.—High River. (Baird).

556. *Metanema inatomaria* Gn.—Banff. July 1st, 1907.

557. *M. determinata* Walk.—Banff. July 1st, 1907.

560. *Brephos infans* Moschl.—Calgary, April 19th, 1913, by Mr. Norman Criddle.

563. *Cossus populi* Walk.? vel *orc* Strk.?—Messrs. Barnes and McDunnough commenced their "Contributions" by a "Revision of the Cossidæ" (Vol. I, No. 1, 1911). There on Plate VII, fig 8, is a reproduction from a coloured figure of Walker's type of *populi* in the British Museum, from St. Martin's Falls, Hudson's Bay Territory, on the borders of Ontario. It is a female, and Sir George Hampson states that the abdomen, though distorted laterally by pressure, is more elongate than in any of its allies. Compared

with others of this group, it seems to be characterized also by lack of tendency of the reticulations to form prominent transverse black lines, or in having dark clouds or blotches. The authors mention having only a single female from Calgary which approximates this, and figure the specimen on plate V, fig. 9. This specimen happens to be more like the type than any in my possession, but shows a tendency towards the development of clouds and well-marked lines possessed by all in my series of five. In my only female the abdomen is about as in that figure, but the maculation is nearer to that of fig. 7, an Arrowhead Lake specimen referred doubtfully to *orc* Strecker. The male and female types of *orc*, from the State of Washington, are figured on plate VI. The female type seems a bit more blotchy than mine, but I can match the male very closely, and believe that all my specimens are really of this species, whatever may be the true relationship to *populi* and *undosus*, the authors suggesting that "It is possible that they are merely geographical forms of the same species."

The fragmentary female type of *undosus* Lint. is also figured on Plate VII, fig. 2, and in maculation appears nearer *populi* than *orc*. The authors state that in the type of *undosus* and in all specimens seen by them the collar is distinctly ochreous. A slight ochreous or brownish tint is present in some of mine, one of which is almost exactly like their fig. 8, plate V, of a Colorado specimen called *undosus*. Holland's figure under this name has much heavier black bands than anything I have seen, and lacks the usual blotches. Barnes and McDunnough give Colorado and Wyoming as the habitat of *undosus*, though they do not denote the type locality. I have specimens of the Alberta form, whatever may be its correct name, from High River, where Mr. Baird says it visits the town lights pretty regularly.

569. *Hepialus macglashani* Hy. Edw.—In Can. Ent., XLIII, pp. 290-292, Aug., 1911, Mr. McDunnough gives us some valuable notes on the group included under *hyperboreus* in Dyar's Catalogue. He states that *macglashani* was described from a series from Truckee, Calif., and that, as described, the band is connected with the inner margin of the wing by a spur of silver. The species is said to bear a great resemblance to *ganna* of Europe. He mentions that Dr. Barnes has a female of *macglashani* from the type locality,

four pairs from Hymers, Ont., and three specimens from Calgary. He seems to imply that all of these specimens have the band connected with the inner margin by a spur. My only two Alberta specimens are those previously recorded, and one of them lacks the spur. Both are pale reddish brown, almost salmon tinted. A pair from Hymers, Ont., are similarly maculate, though both have the spur, but the colour is much darker brown, especially in the secondaries. A female from Duncans, V. I., is apparently closely allied to the Calgary form, but is of a more fuscous pale brown, without any reddish tints, and has faint, diffuse fuscous cloudings in various portions of the wing, and two small, faintly silvered discal dots in one of these clouds at the end of the cell on primaries.

Additional Heterocera.

The number of species of Heterocera which have come to hand, or been recognized, or of which authentic records have been procured too late for insertion in their order in my original list, is large, roughly, some hundred and twenty. Considering that it is about nine years since that list was commenced (Vol. XXXVI, p. 345, December, 1904), and seven since its completion (Vol. XXXVIII, p. 267, August, 1906), a much larger number of additions might have been expected, had collecting been done as assiduously of recent years as it was formerly. Mr. Arthur Hudson and the author used to collect, principally at night, on a somewhat extensive scale, for some twelve or fifteen years, though such collecting was for the most part restricted to a very small area. The cessation has been gradual, and, for a variety of reasons, the collecting done by us during the few past years has been practically nil. That the list could yet be largely augmented if researches were carried on extensively further afield, is evinced by the high percentage of fresh species found in occasional small consignments received from distant localities. For instance, Lethbridge, in Southern Alberta, the driest portion of the Province, and practically the northern limit of the desert region, has, to judge from the captures made on occasional visits by one or two collectors there, many species unknown, or of extreme rarity further north. Mr. N. B. Sanson has done considerable collecting, chiefly at light, at Banff, in the Rockies, for the past few seasons, and discovered

a large number of forms previously unrecorded from the province, and several species of extreme rarity in collections, some entirely new. Mr. Bean, who I believe left Laggan for his old home in Illinois about 1895, probably has many records which have not yet come my way, though I found a few of his captures new to me in eastern collections. In a very small collection from Edmonton, shown me by Mr. F. S. Carr, the percentage of fresh records was high, and even the city of Calgary has produced species never taken on Pine Creek. An extensive collection was made at Calgary, and some fifty miles further northwest, near Didsbury, throughout several seasons. But I never had a chance to look through them, though the results of the small portion I did examine were tantalizing. My "List" was quite correctly entitled "Preliminary."

584. *Hemaris thysbe* Fabr. var. *cimbiciformis* Steph.—A specimen taken at sallow blossoms at Edmonton on May 13th, 1910, is now in my collection. I recorded the specimen as *ruficaudis* Kirby in Mr. Gibson's "Record" for 1910. I now follow Messrs. Barnes and McDunnough's treatment of the forms in their List of Sphingidæ, Psyche, XVII, p. 200, Oct. 1910. They there make *thysbe*, *fuscicaudis* and *cimbiciformis* forms of one species, and state that the latter has olive markings on last abdominal segments, and anterior edge to outer brown borders of primaries entire, and not dentate as in *thysbe*, to which they refer *ruficaudis* Kirby—not recognisable from Kirby's description—as a synonym. I have exactly the same form from Field, B.C., dated July 6th, perfectly fresh, and from Chicago, June 28th and Aug. 4th. The form has the olivaceous thorax of Holland's Pl. II, fig. 5, of *thysbe*, and differs in that respect from his fig. 6 under *cimbiciformis*, of which it has the entire border. I have another Chicago specimen almost exactly like this fig. 6.

585. *Lepisesia juanita* Strk.—A male taken by the author, feeding on the wing at thistles, on the Red Deer River, 50 miles northeast of Gleichen, on July 6th, 1905, comparatively fresh. The secondaries are a bit paler, and the anal mark less distinct, but otherwise it is extremely like the *juanita* of Holland's figure. I have *clarkiæ* from Oregon, and from Duncans and Wellington, Vancouver Island. These differ in many details of shape, colour

and maculation, including the absence of the anal ocellate mark on secondaries. *Juanita* was described from Texas.

586. *Amphion nessus* Cram.—I have a single specimen from High River, from Mr. Baird, rather worn, and possibly a migrant.

587. *Sphinx luscitiosa* Clem.—A female is in my collection, taken west of Didsbury, Alta., by a Mr. C. G. Garrett.

588. *S. pinastri* Linn.—Barnes and McDunnough, in their Sphingid paper quoted above, state that Dr. Barnes has two specimens of this species, one labelled California, the other Waghorn, Alberta. Presuming the latter label to be correct, the capture was perhaps made by Mr. P. B. Gregson.

According to Smith's Monograph of Sphingidæ (Trans. Am. Ent. Soc. XV, pp. 49-241, 1888) Strecker described this species under the name *saniptri*, but subsequently referred it as synonymous with the European *pinastri*. His types were a male from "Canada," received from Mr. Reakirt, and a female taken by himself on a fence near some pine woods at Reading, Pa. Holland states that Strecker took the species at Reading on one or two occasions. It is listed by Dyar as a doubtful U. S. species. Judging from the British figures I have seen, it should not easily be confused with anything else North American.

589. *Turuptiana permaculata* Pack.—Red Deer River, northeast of Gleichen, July 1st, 1905, flying at dusk. I have four specimens, exactly like Holland's figure. It did not appear to be by any means rare, and indeed I was assured by local residents who professed to recognize it that it was sometimes very abundant, and I have been given the same report from the Lethbridge district, though, of course, such records are not authentic. I have certainly received and named the species from other points in the western provinces, but cannot at present find the references.

590. *Diachrisia virginica* Fabr.—Edmonton, June 3rd, 1910. (F. S. Carr.)

591. *Euchætias oregonensis* Stretch.—Didsbury, June 27th, 1907. (C. G. Garrett.) A single male is in my collection, agreeing with Holland's figure, and with the description given in Hampson and in Neumœgen and Dyar's "Bombyces."

592. *Panthea virginaria* Grt.—Dr. Barnes told me several years ago that Grote's *Biston virginarius* (No. 3866, Dyar Cat.)

was a *Panthea* allied to *gigantea*. I recently examined the type in the British Museum, and that is evidently correct. It comes from Shasta Soda Springs, California (Hamps. Cat., XIII, 370, pl. CCXXXIV, fig. 10). Mr. Sanson has taken two specimens of a *Panthea* at Banff, a female on July 16th, 1906, on Sulphur Mountain, and a male on June 1st, 1910. I have examined both of these, the former in Smith's collection, and recorded them, apparently wrongly, as rather dark *portlandia* in the "Record" for 1910. I have in my collection a similar female which I took on a station light at Field, B. C., on July 16th, 1907, and this I have compared with Grote's type of *virginaria*, and consider it the same, though it has heavier cross lines. I did not feel confident as to the distinctness of the *gigantea* of the British Museum. I have not seen Grote's description of *portlandia*, but have a Wellington, V. I., specimen agreeing with Holland's figure, and with that in Smith and Dyar's "Monograph of Acronycta," where the habitat given is the northern Pacific coast, from Oregon to Vancouver Island.

593. *Acronycta dactylina* Grt.—I have four males taken here from July 5th to 17th, in 1901, '04, and '09. Two of these were included in my original notes under *canadensis*. The female is from High River, from Mr. Baird. They are a trifle bluer grey than eastern specimens, one of which, from Lowell, Mass., I have compared with Grote's type from New York, but they appear to be the same species. *Hesperida* Smith was described from two males and six females from California; Seattle and Tacoma, Washington; Nanaimo and Vancouver. I have seen three specimens labelled "type," one of which is labelled "Victoria, B. C.," which is presumably intended by "Vancouver" in the description. I consider it a dark variation of *dactylina*, all wings, including even the secondaries in the male, being more suffused with brown than those from east of the Rockies. The dark secondaries, as I have elsewhere pointed out, are a feature common to many B. C. forms. Smith adds that "the dagger mark opposite the anal angle is entirely absent." It is present in two out of my six B. C. specimens, and, moreover, it is sometimes absent from eastern *dactylina*. Hampson figures as *hesperida* a female from Aweme, Man., but it is not typical. I have specimens from Miniota, Cartwright, and Winnipeg, and they are like the local form.

594. *A. felina* Grt.?—I have a single male taken at the head of Pine Creek on June 20th, 1895, being one of those four specimens originally treated by me under *canadensis*, which I have compared with a male type of *felina* from the Sierra Nevada in the British Museum. This type is well figured on Plate CXXVI, fig. 3, of Hampson's Catalogue, but the figure is too brown. My specimen differs in a few minor details, but appears to be the same species. There is a female type of *felina* from the same locality in the Henry Edwards collection, which did not satisfy me as being the same species as that in the British Museum, but this comparison was from memory only. It seemed to me nearer *cyanescens* Hampson, from Vancouver, but paler. At any rate the two are close allies, and *metra* Smith, from Seattle, Wash., and Colorado, is doubtfully distinct from *cyanescens*. The *felina* of the British Museum is not like that figured in Smith and Dyar's Monograph.

595. *Arsilonche henrici* Grt.—Two specimens, June 17th, 1906, and June 5th, 1910. They are much darker and more streaky than my specimens from the east and are irrorate with smoky. The species appears to have a wide range of variation. The type of *henrici* is very streaky and grey, that of *evanidum* being rather even and not grey. Both are in the British Museum and appear to be from New York. *Fumosum* Morr., of which the type is in the Tepper collection, is called "ab. 1" by Hampson, almost entirely suffused with slate-grey." Sir George Hampson keeps *henrici* distinct from the European *albovenosa* as being darker brown and having blunter apices to the primaries. My own notes say, concerning the British Museum series: "All are much more even and less powdery than a series of *albovenosa* here." Some European students, including Tutt, have claimed to have found them identical. As regards my series from each continent, the differences in wing form certainly do not hold, and the contrast between the pale veins and the ochreous or brown interspaces is greatest, as a rule, in North American specimens. My Calgary examples, which seem to be about typical *henrici*, agree very closely in colour with a Bavarian specimen sent me by Bang Haas as ab. *albida* Auriv., but have more dark interspaceal shades. I neither possess, nor have I seen, any specimens which cause me to consider *albovenosa* and *henrici* strictly synonymous, though the relationship

is certainly very close indeed. Grote's note under *henrici* in his 1895 List—"an spec. europ.?"—is apparently intended to apply to "aberr. *fumosum* Morr." only.

596. *Merolonche lupini* Grt.—Three specimens taken at Banff. Two of them dated June 6th and 12th, 1910 (Sanson).

597. *Bryophila avirida* Smith.—(Journ. N.Y. Ent. Soc., XIV, p. 10, March, 1906).—Described from four specimens. The male type is from Cartwright, Man., and the female from Ft. Collins, Colo. I took several specimens on the Red Deer River on July 6th and 7th, 1905, and have a good series from Miniota and Cartwright, Man., dated from June 14th to July 8th. Mine were beaten from bushes in the daytime. As described it is darker and more obscurely marked than *lepidula*. It is also stated to have "all the green shading eliminated." Hampson mentions no green, and yet, to my eye, an olivaceous green tinge is evident both in the types and in every one of my series of thirteen specimens, and in some from Miniota it is very pronounced. Hampson, besides specimens from Manitoba and Alberta, lists a female from New York. The type of *lepidula* is catalogued as from Missouri, and has most of the pale areas pale green. A Columbus, Ohio, female in Smith's collection, seemed to me about intermediate, as, indeed, are some of my Miniota specimens. From what I have observed I feel bound to look upon the form as a variation of *lepidula*.

598. *Senta defecta* Grt.—Two at light at head of Pine Creek on August 15th and September 3rd, 1904. A third bred in August, 1905, from larva found in stem of a reed-like grass known locally as "red-top" in a slough on the prairie near Gleichen a few weeks previously. A number of larvæ were secured, the stems being cut off above and below them and placed upright in wet sand, but all the rest died. I have compared one of the specimens with the type, catalogued as merely from "U. S. A."

599. *Luperina extensa* Smith.—(Journ. N. Y. Ent. Soc., XIII, 203, Dec., 1905).—Type a male from Regina, Sask. Syn. *Perigea flavistriga* Smith (id. p. 204). Type a female from Lethbridge, Alta. The descriptions were made from single specimens, both taken by Mr. T. N. Willing. The synonymy has been published by Smith himself. I have a female taken at treacle by myself at

the Red Deer River locality—now known by the name of an adjacent post office, Dorothy—on July 23rd, 1907, which I have compared with both types in Smith's collection. In that collection also are a pair from Bozeman, Montana, Aug., 1908, and a female from Westbourne, Man., Aug. 3rd, 1908, from Mr. J. B. Wallis. Sir George Hampson gives figures from coloured drawings sent him of both types. That of *flavistriga* is most like my specimen, but shorter winged. That of *extensa* is in accordance with my notes on that type, which is browner than any of the rest I have seen, though when I saw it it was greasy and probably discoloured.

600. *Hadena castanea* Grt.—This name stands wrongly in our lists as a synonym of *pluviosa*. The type of the latter is in the British Museum and is a very badly worn specimen from Vancouver Island. It is, as Hampson lists it, the species well known as *arctica* Bdv., which I believe was described from Labrador. A type of *castanea* is in the British Museum from California, and, according to Smith's Catalogue, there is another in the Tepper collection. That of *cymosa* from Washington Territory is in the British Museum also, and is the same as the type of *castanea* there, and distinct from *arctica*. *Castanea* is sienna brown, and *cymosa* fuscous brown, whilst the "ab. 1" of Hampson is a variegated form with pale shades in the subterminal area. *Castanea* occurs on Vancouver Island, often apparently in considerable numbers. *Arctica* occurs there also, but less commonly. Whilst I think it improbable that the two are one species, the variegated form of *castanea* sometimes resembles *arctica* so very closely as to make separation a matter of the very greatest difficulty, if not occasionally impossible.

In the Kootenai List Dr. Dyar records under *pluviosa* three specimens from Banff, Alta., July 21st, Aug. 11th and Sept. 10th, 1904, adding: "Apparently distinct from *arctica* Bdv., but very close to it." I did not see the specimens when at Washington, but must assume that he took the variegated form of *castanea*, and therefore so record it. I have not found the species amongst specimens sent me from time to time by Mr. Sanson.

601. *H. loda* Strk., syn. *albiserrata* Sm. Mr. Sanson has taken two males of this species at light at Banff, on Sept. 2nd, 1908, and

Sept. 16th, 1910. I have published a note on this species in Ent. News XXIV, 356, Oct. 1913.

602. *H. maida* Dyar.—(Can. Ent., XXXVI, 30, Feb. 1904.)—Two females at Banff, Sept. 22nd, 1910 (Sanson). Described from Kaslo.

[168a. *H. illustra* Smith.—(Ann. N. Y. Acad. Sci., XVIII, 114, 1908.)—Described from a single female taken at High River by Mr. Baird. I have an unusually black, uniform female of *commoda* taken here, which I have compared with it, and labelled as undoubtedly identical. I should have referred to the form under that heading.]

(To be continued.)

NEW SOUTH AMERICAN MEMBRACIDÆ.

BY W. D. FUNKHOUSER, ITHACA, N. Y.

(Continued from p. 363.)

7. **Ennya pulchella,** sp. nov. (Pl. XXIV, fig. 7).

A very remarkable and beautiful little species, apparently quite different from any hitherto described, although it may be somewhat near *E. rufipes* Fairm., a species which I have never seen. Superficially it much resembles a small, deeply-ridged *Telamona*. It should be easily recognized by the characteristic dorsal crest and the two bright nile-green spots on each side.

Golden brown with green spots. Pronotum extended dorsally into a thin squarish crest, slightly step-like posteriorly. Entire dorsal surface deeply ridged and punctate. Head yellowish; much broader than long, finely punctate, apex rectangular; ocelli transparent, equidistant from each other and from the eyes; eyes brown. Pronotum deeply and roughly punctate: light green in front, brown on dorsal and lateral surfaces, except for two bright green spots on each side near lateral margin; high, thin, squarish crest above and somewhat behind lateral angles, anterior margin sloping, posterior margin with angle near base of declivity, marked on each side with three perpendicular ridges, the first short, the second long and slightly curved, the third bifurcate at the tip; lateral surfaces of pronotum with four prominent ridges on each side, and two bright green spots, the first extending from the mar-

gin to the second ridge, the other extending from the margin to the third ridge; humeral angles greatly produced, triangular; posterior process gradually acute, sharply depressed at apex, extending just to the tip of the tegmina. Tegmina more than half covered by the pronotum, brown and punctate on its dorsal two-thirds, apical third hyaline, extreme tip black. Legs and under surface of body concolorous yellow brown.

Type.—Female.

Length 6 mm.; width at humeral angles 4 mm.

Locality.—Peru.

Described from one specimen.

8. **Antonea nodosa,** sp. nov. (Fig. 8).

Clear, shining lemon-yellow throughout, with tiny black spots on head, legs and abdomen. Pronotum swollen into large globular nodules and terminating in a sharp spine. Entire pronotum more or less translucent in dried specimens. Near *A. flaccida* Fairmaire, but smaller and differing in number of nodules and in colour.

Head smooth, yellow; a deep longitudinal depression laterad of each ocellus; ocelli yellow with orange border, much closer to each other than to the eyes; eyes very large, black with orange border; small black spot just below each eye. Prothorax smooth, shining, with six globular swellings set off from each other by punctate depressions. These swellings are located as follows: One above the head on each side, very large, bearing short, sharp horn and many long bristly hairs; one in middle of dorsum just behind these two bearing a few scattered hairs; one on each side below this middle bulb, smooth; one just before posterior process very large and almost spherical. Posterior process long and sharp, extending to a point half way between internal angle and tip of tegmina. Tegmina perfectly hyaline throughout; veins yellow and prominent. Abdomen yellow; second segment with black spot on each side. Legs yellow; a black spot at tip and a black ring near the base of each tibiæ and at the base of each femur; tarsi yellow; claws flavous.

Type.—Female.

Length 7 mm.; width between extremities of horns 4 mm.

Locality.—Bolivia.

Described from three females and two males. The males are neither smaller nor darker than the females.

Subfamily *HOPLOPHORINÆ.*

9. **Aconophoroides rectispina,** sp. nov. (Fig. 9).

This species suggests at once an *Aconophora*, but the very short hind tarsi removes it from the subfamily to which that genus belongs. It may be recognized by the erect pronotal process, black with yellow tip. The four apical cells of the hind wing are characteristic of the genus.

Yellow, deeply and coarsely punctured with black; pronotal horn straight and nearly upright, black, tip yellow. Head rough, striated, wider than long; clypeus short, inflexed, with median translucent ridge; ocelli transparent, nearer to each other than to the eyes, a black spot under each; eyes prominent and brown. Pronotum coarsely punctured, not pubescent; dorsal horn projecting upward and slightly forward, anterior and posterior margins flattened, black, except at tip, which is smooth and yellow; humeral angles obtusely prominent; posterior process long, narrow, lightly punctured, slightly pilose, extending far beyond abdomen and almost reaching tips of tegmina. Tegmina yellow, subhyaline, much wrinkled between veins; veins brownish and slightly raised. Legs and under surface of the body ferruginous. First and second pairs of tarsi very long and black; hind tarsi short and yellow.

Type.—Female.

Length 10 mm.; width 4.8 mm.

Locality.—Bolivia.

10. **Aconophoroides projecta,** sp. nov. (Fig. 10).

Superficially recalling a large *Aconophora*, but, like the preceding species, easily distinguished by the very short posterior tarsi and the four apical areas of the hind wings.

Uniform ferruginous brown; pronotal horn short, sharp and projecting forward; thickly covered witn more or less obsolete longitudinal carinæ and densely punctate. Head much wider than long, rough and sculptured; clypeus short and reflexed, sparingly pilose; ocelli brown, equidistant from each other and from the

eyes; eyes very prominent, round and black. Pronotum densely and roughly punctured and lightly ridged with faint percurrent median carina and bearing short porrect horn; this horn sharp, subconical, anterior and posterior margins flattened, three or more longitudinal ridges on each side, the middle one sharp and distinct; posterior process long and narrow, gradually acuminate, slightly depressed, extending just to tips of tegmina; humeral angles obtuse, not prominent. Tegmina brown and wrinkled, veins broad and distinct, base and costal area slightly punctate, apical border blackish. Under surface of body black-brown. Legs thick, strong, concolorous ferruginous, slightly pilose; hind tibiæ broadly spatulate; hind tarsi very short.

Type.—Female.

Length 10 mm., cum corn. 13 mm., width 5 mm.

Locality.—Bartica, British Guiana.

Collected Feb. 15, 1913, by Mr. H. S. Parish.

Subfamily *TRAGOPINÆ*.

11. **Tragopa luteimaculata** sp. nov. (Fig. 11).

Near *T. humeralis* Fairm., but much smaller and differing in colour and in the markings of the prothorax. Easily recognised by the fourteen bright yellow spots which stand out in striking contrast to the beautiful shining black-brown pronotum.

Nearly twice as long as wide; black-brown with yellow spots; humeral angles rounded; posterior process acute. Head twice as wide as long; smooth, deep brown with median longitudinal yellow stripe starting between the ocelli and extending to the clypeus; ocelli white, farther from each other than from the eyes; eyes black, narrowly bordered with yellow. Pronotum black-brown; very finely punctured, not pubescent; gradually sloping above head; marked on each side with seven irregular yellow spots, each spot faintly bordered with crimson. These spots are arranged on each side as follows: one between humeral angle and eye; one behind humeral angle; two on lateral margin; two in middle of dorsum nearly touching median line; one very large spot covering entire posterior apex. Posterior process subacute, reaching beyond tips of tegmina. Tegmina black and opaque, more than

half concealed by the pronotum; apical limbus very broad and corrugated. Abdomen black; legs yellow.

Type.—Female.

Length 3.4 mm.; width between humeral angles 2.2 mm.

Locality.—Peru.

12. **Tragopa decorata** sp. nov. (Figs. 12 and 13).

About the size of the preceding. Apparently near *T. fulvovaria* Fairm., in its decorations; but smaller, not black, and without the large posterior spot of Fairmaire's species. The head shows no markings.

Decidedly longer than wide; beautiful rich chocolate brown shading to light brown on shoulders and head; decorated with numerous irregular yellow dots and bars bordered with dark brown. Head slightly wider than long; uniform light brown; front convex; ocelli yellow, farther from each other than from the eyes; eyes black bordered with yellow. Pronotum chocolate brown, shining, very finely and faintly punctured; humeral angles rounding; apex obtuse; a crescent-shaped row of yellow dots connecting the humeral angles, these dots joined together near shoulders to make a short stripe; behind this row a transverse area filled with very small dots which in the same manner join to form a stripe at the margin; apex concolorous yellow-brown. These dots and fascia are bordered by bands of dark brown and are not symmetrically arranged bilaterally. Tegmina very dark brown, opaque, more than half covered by the pronotum, border wide and wrinkled. Legs and undersurface of body yellow. Tarsi and tips of tibiæ fuscous-brown.

Type.—Female.

Length 3.6 mm.; width 2.4 mm.

Locality.—Bolivia.

The fore-wings of the genus *Tragopa* are most peculiar and are entirely different from the wings of other Membracidæ. The wing of *T. decorata* figured is a good example of this interesting wing structure and is remarkable not only for the venation but also for the broad, corrugated limbus.

Explanation of Plate XXIV.

Fig. 1. *Tropidoscyta brunneidorsata*, sp. nov.

Fig. 2. *Tropidoscyta binotata*, sp. nov.

Fig. 3. *Tropidoscyta maculata*, sp. nov.

Fig. 4. *Bolbonota lutea*, sp. nov.

Fig. 5. *Bolbonota nigrata*, sp. nov.

Fig. 6. *Metheisa sinuata*, sp. nov.

Fig. 7. *Enna pulchella*, sp. nov.

Fig. 8. *Antonea nodosa*, sp. nov.

Fig. 9. *Aconophoroides rectispina*, sp. nov.

Fig. 10. *Aconophoroides projecta*, sp, nov.

Fig. 11. *Tragopa luteimaculata*, sp. nov. Dorsal view.

Fig. 12. *Tragopa decorata*, sp. nov. Dorsal view.

Fig. 13. Fore-wing of *Tragopa decorata*.

MR. LYMAN'S COLLECTIONS.

The late Mr. Henry H. Lyman, a former President of the Entomological Society of Ontario, of whom a portrait and obituary notice were given in the July number of this magazine, left an estate valued at $1,268,315. By the terms of his will his entomological collections and library are left to McGill University, together with the sum of $40,000 for their preservation and augmentation. He added: "It is my desire that so long as there may be maintained in Montreal an active Branch of the Entomological Society of Ontario, the President and Secretary of such Branch should be associated with the Professor of Zoology." It is stated that the University has accepted the legacy on these terms.

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BEES VISITING HELIANTHUS.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

The genus *Helianthus*, consisting of the annual and perennial sunflowers, is native only in America, though widely cultivated in the Old World. The common sunflower, *H. annuus*, is wholly sterile with its own pollen, and has to be visited by insects in order to produce seed. Presumably the same is true of the other species of the genus. The insects carrying the pollen are various, but the bees are far more important than all the rest combined; their incessant activity can only be appreciated by one who has worked with sunflowers throughout the summer.

At Goodview, Colorado, August 2, 1913. I took a census of insects on flowers of cultivated *H. annuus* (var. *coronatus*) for a short time, with this result: *Andrena helianthi*, 12; *Halictoides marginatus* (perhaps some were *Halictus*), 9; *Halictus armaticeps*, 4; *Melissodes*, 2 ♂, 1 ♀; *Panurginus innuptus*, 1; *Apis mellifera ligustica*, 1; *Syrphid, 1*. These were recognized as they flew, but on July 18, I collected a series of bees from the same flowers, at the same place, and found I had *Andrena helianthi* Rob., *Halictus armaticeps* Cress., *Halictoides marginatus* (Cr.), *Panurginus innuptus* (Ckll.), both sexes, *Melissodes aurigenia* Cress., ♀, *M. confusiformis* Ckll., ♀, and *Megachile agustini* Ckll., ♂.

The domesticated honey-bee, belonging to the Old World genus, is here an insignificant factor in sunflower pollination. Mr. Collins of Boulder, who has many hives of bees, informs me that they do not go to sunflowers unless the supply of other nectar runs short. When they do make honey from sunflowers, it is very yellow.

The most important sunflower bee, with us, is certainly *Andrena helianthi*. In some localities it is probable that the species of *Megachile*, which work fast and carry a lot of pollen, do more work. *M. helianthi* Ckll. was collected by Rohwer on the wild sunflower (*Helianthus annuus lenticularis*) at Boulder, Colorado.

Mrs. C. Bennett, in August 1908, took males of *M. parallela* Sm. and *M. manifesta* Cr., at flowers of *Helianthus* at Denver. *M. augustini* Ckll., ♂, was collected at Boulder, Aug. 8, on *H. annuus coronatus*. Male bees visiting sunflowers get covered with pollen, and must be almost as useful as females.

At Sterling, Colorado, far out on the plains, I collected bees from *H. annuus lenticularis* on Aug. 3, 1911. Several of the species (Canad. Entom., Nov. 1911, p. 390) were the same as those found at Boulder, but others were present, and, in particular, *Anthophorula bruneri* (Crawf.) was abundant and evidently an important factor in pollination.

The above lists happen to lack now other types of bees which are more or less important visitors of sunflowers in Colorado; *Bombus* and the Anthidiines. The Bombi on sunflowers are principally males, and the same is true in European gardens, as may be seen by the list in Knuth's "Blütenbiologie." The Anthidiines (at Boulder *Heteranthidium zebratum* (Cr.), *Dianthidium perpictum* Ckll., and *D. sayi* Ckll.) and efficient, but not abundant enough to be of great consequence.

In suitable localities, *Perdita* abounds on sunflowers. Thus, in Nebraska (Swenk and Cockerell, 1907) eight species are recorded, some of them regular visitors, others only occasional. In Nebraska and New Mexico, *P. altipennis* and its immediate allies (subgenus *Cockerellia* Ashmead) are especially found on *Helianthus*, though there are members of this group attached to other Helianthoid Compositæ, as *Ratibida* and *Ximenesia*.

Diadasia cannot be regarded as a normal or regular visitor of *Helianthus*, yet it occurs from time to time. I collected males of *D. australis* Cr. on sunflower at San Bernardino, California, many years ago; and females of *D. enavata* Cr. on *H. lenticularis* at Mesilla, New Mexico.

At Falfurrias, Texas, May 18, 1907, Mr. A. C. Morgan collected one female each of *D. australis* Cr. and *D. afflicta* Cr., at flowers of *Helianthus*. The *D. australis* had collected much yellow pollen on the hind legs, but the large smooth grains were apparently cactaceous, certainly not from *Helianthus*. However, the compound microscope showed also a small quantity of the small grains of

Helianthus, scattered about. The *D. afflicta* carried only a little pollen on the legs, but it also had both sorts, and *Helianthus* grains also on the wings.

We must probably conclude that these species of *Diadasia*, regularly visiting Cactaceæ for nectar and pollen, rested from time to time on the discs of *Helianthus*, and accidently became dusted with pollen from these. In this way, without actually feeding on *Helianthus*, these bees might become pollinating agents.

We are almost without records of sunflower visitors in the Pacific coast region, and I have no data from Central and South America, although rather numerous species of *Helianthus* exist in the mountains from Mexico to Peru. Graenicher in Wisconsin and Robertson in Illinois have made many observations of interest on the visitors of the perennial species. Records from Canada, the Atlantic seaboard and the Southern States are much to be desired. The Entomologists of the U. S. Department of Agriculture stationed in Texas have secured enormous series of insects of all orders, including a considerable number from *Helianthus*, but the labels do not, as a rule, show what species of *Helianthus* are involved. I have been very kindly permitted to examine many of the bees, and also to use the records kept on file in Washington. I give here some illustrative data:

(1.) Dallas; Sept. 21, 1905. At *H. maximiliani*. C. R. Jones. *Nomia nortoni* Cr., det. Crawford; *Halictus armaticeps* Cr. (*ligatus* Auctt.); *Megachile parallela* Sm.

(2.) Clarendon; Aug. 11, 1905. At sunflower. C. R. Jones. *Perdita xanthismæ* Ckll.; *Triepeolus remigatus* (Fabr.), det. Bishopp; *Melissodes obliqua* Say.

(3.) Victoria; October 2. At *Helianthus*. Crawford and Leister. *Nomia heteropoda* Say.; *N. apacha* Cr.

(4.) Wichita Falls; June 10, at *Helianthus*. J. D. Mitchell. *Nomia bolliana* Ckll.

(5.) Falfurrias; May 18, at *Helianthus*. A. C. Morgan. *Nomada garciana* Ckll.; *N. texana* Cr.; *Osmia subfasciata* Cr., ♂; *Melisodes suffusa* Cr., ♂; *Anthophorula margani* Ckll.; *Halictus ligatus* Auctt. (det. Crawford); and other species recorded elsewhere in this paper.

Various species of *Megachile* have been recorded elsewhere. It will be observed that in Texas the species of *Nomia* become quite conspicuous. In New Mexico *N. triangulifera* Vachal occurs on *Helianthus*.

Do the bees distinguish the annual and perennial sunflowers, or between the species of either group? Are there species of bees adopted to particular species of *Helianthus?* At present we cannot produce any satisfactory evidence on this point; differences observed may be no more significant for the discussion than those between the visitors of the same species (*H. lenticularis*) in different regions. Robertson, in Illinois, finds *Andrena helianthi* Rob., *A. pulchella* Rob., and *A. aliciæ* Rob., on perennial sunflowers. At Boulder we get only one of these on the annual species, *A. helianthi;* but in New Mexico *A. pulchella* appears on *H. lenticularis*. In the vicinity of Milwaukee, Wis., Graenicher gets four species of *Andrena* on sunflowers; *A. helianthi* Rob. (the most common), *A. aliciæ* Rob., *A. peckhami* Ckll., and *A. clypeonitens* Ckll. These all visit perennial species.

In view of the fact that *Helianthus* is exclusively American, and possesses in our fauna a long series of more or less adapted bee-visitors, it becomes very interesting to enquire what happens when sunflowers are grown in the Old World. Do the bees of those regions find them out, and if so, are they allied to the regular American sunflower bees?

Aljken, in Bremen (Abh. Nat. Ver. Bremen, XXII, pp. 180-181) observed the bees visiting cultivated *H. annuus*. His list is as follows: *Bombus*, 8 species; *Psithyrus*, 3 species, all males; *Megachile*, 2 species, females; *Halictus leucozonius; Coelioxys acuminatus; Apis mellifera; Anthidium manicatum*. It will be seen at once that this closely corresponds in character with American lists, leaving out the genera peculiar to America, and also certain genera, as *Andrena*, our species of which appear to be oligotropic.

The perennial sunflowers in European gardens are visited by *Apis, Bombus, Psithyrus, Halictus, Megachile* and *Heriades*.

In Australia, Mrs. M. Anderson collected bees for me from flowers of *H. annuus*, and it was very interesting to find that

Trigona carbonaria Sm. freely visits them, collecting pollen. No species of *Trigona* occurs within the natural range of the *H. annuus* group.

At Gisborne, New Zealand, Mr. W. D. Cook kindly observed the insects on *H. annuus coronatus* in 1913-14. He did not send any specimens, but his account is sufficiently clear to permit the recognition of the bees, and I have inserted the names within brackets:—

"There seem to have been very few bees about this year; at any rate very few visited the sunflowers. I noticed a few ordinary German bees [*Apis mellifera* L.], a few bumble-bees, and a tremendous number of the common cream-coloured moth, and also a great many flies. [The bees] were nearly all a small black bumble-bee. There seem to be very few big bumble-bees about here (I mean the black one with the yellow band [*Bombus terrestris* L.]), but the one I saw most was about half the size and pure black (much larger than an ordinary bee)" [*Bombus ruderatus fidens* Harris.]

Thus in New Zealand the only bee-visitors were the introduced species of *Bombus* and *Apis*, as might be expected from the absence of native long-tongued bees. Had the sunflower reached that country before the bees, perhaps the flies would have been fairly satisfactory pollinators.

I add to this paper descriptive notes on some sunflower bees, two of which are new.

Melissodes semiagilis (Cockerell).

Melissodes agilis semiagilis Cockerell, Ann. Mag. Nat. Hist., April 1906, p. 364, ♂.

♀. Length about 11 mm.; pubescence grayish-white, tinged with ochreous, vertex with black hairs, scutellum and posterior part of mesothorax with much black hair, the tegulæ separated from the black patch by a band of pale hair about equal to their width; head broad; flagellum dusky reddish beneath, except at base; first abdominal segment with a narrow pallid hind margin, the others with hind margin dark; second segment with pale hair at extreme base, and a rather broad median hair band; third segment with median band twice as broad as that on second; tibia of hind

legs with scopa strongly plumose, long and loose, wholly pale; hair on inner side of hind tibiæ fusco-ferruginous.

In my table in Trans. Amer. Ent. Soc., XXXII, the female runs to the vicinity of *M. gilensis communis* and *hortivagans*. It is smaller than *gilensis*, with much clearer wings, and hair on outer side of middle tibiæ all pale (largely dark gray in *gilensis*). The same characters at once separate it from *hortivagans*. The wings are much paler and shorter than in *communis*, and the band on middle of second abdominal segment is much broader. The hind margin of fourth abdominal segment has dark hair only in middle, not right accross as in *M. wheeleri*. Among Robertson's species *M. semiagilis* female resembles *M. vernoniæ*, which has short, still clearer wings; but *vernoniæ* has a patch of black hair on outer side of middle tibiæ apically, the hair on abdomen whiter, and the hair on inner side of hind basitarsi black.

Hab.—Quanah, Indian Territory, at flowers of *Helianthus*, June 10, 1906 (*J. D. Mitchell*), U.S. Nat. Museum, 9♂, 4♀. A female from Dallas, Texas, at *Helianthus*, Sept. 22, 1905 (*F. C. Bishopp*) has a little dusky hair at apex of middle tibiæ, and the hair on inner side of hind basitarsi is fuscous; but the general appearance and colour of the hair agrees exactly with *semiagilis*, not with *vernoniæ*. Thus it rather approaches *M. simillima* Rob.

Melissodes suffusa Cresson, variety.

♂. Differs from a cotype in having the flagellum only obscurely reddened (instead of bright clear ferruginous) beneath; otherwise normal.

Hab.—Falfurrias, Texas, on *Helianthus*, May 18, 1907, (*A. C. Morgan*).

Melissodes bishoppi sp. n.

♂. Runs in my table in Trans. Amer, Ent. Soc., XXXII, to the vicinity of *M. aurigenia* Cresson, which it closely resembles differing as follows: Third antennal joint (view from front) 192 μ long, fourth 752 (the same measurements for *aurigenia* are 128 and 1040); the third joint very much longer than second; flagellum about 5½ mm. long (about 7½ in *aurigenia*); nervures darker; second s. m. narrower; third t. c. angular in middle;

hind knee-plate larger; hair of hind tibiæ whiter and less spreading; first two abdominal segments very distinctly punctured; subhyaline margins of segments less than half as wide. Clypeus, labrum and large spot on mandibles yellow; hair of thorax above wholly pale ochraceous; flagellum entirely red, bright beneath, a little dusky above; small joints of tarsi red; hair on fifth and sixth abnominal segments light; wings as clear as in *aurigenia*. The abdomen is without hair-bands. Tegulæ light fulvous. Eyes dark brown.

Hab.—Paris, Texas, at *Helianthus*, Aug. 27, 1905 (*F. C. Bishopp*), U. S. National Museum. The *M. aurigenia* compared is a cotype from New York.

Xenoglossodes helianthorum sp. n.

♂. Length about 10 mm.; black, with abundant pure white hair, light orange on inner side of basitarsi; head broad; eyes greyish-brown; clypeus (except upper third), labrum and basal half of mandibles cream-colour; apical half of mandibles ferruginous; head and thorax with dense long hair; antennæ reaching the second abdominal segment; third and fourth joints (from front) measuring respectively about 160 and 1120 μ; flagellum dark rufofuscous, redder beneath, but not brightly coloured; mesothorax shining, well punctured; tegulæ almost wholly hidden by hair, their margins pallid; wings short, hyaline, with ferruginous nervures and stigma; second s. m. very large and broad; small joints of tarsi ferruginous; abdomen entirely covered with white hair, long at base, otherwise short, denser on apical margins of segments, producing obscure bands; subapical lateral spines very small; short fuscous hair on each side of apical part of apical plate; last ventral segment with two large oval depressions.

Hab.—Falfurrias, Texas, at *Helianthus*, May 18, 1907 (*A. C. Morgan*). U. S. National Museum. I have not ventured to extract the mouth-parts of the unique type, but refer the insect with confidence to *Xenoglossodes*, where it falls near *X. albata* (Cress.), differing by being larger and more robust, with upper part of clypeus black.

LUCILIA SERICATA MEIGEN ATTACKING A LIVE CALF.*

BY H. F. HUDSON, B.S.A., ENTOMOLOGICAL BRANCH, OTTAWA.

While walking through a pasture field at Strathroy, Ont., on July 1st, my attention was directed to a well-bred herd of young Holstein cattle. There were among them twelve calves from five to six weeks old. On looking them over, I noticed that one of the calves had a sickly appearance and was extremely thin. This calf appeared to be suffering from an acute attack of white scours, and all known remedies seemed to be useless. It was becoming weaker although still able to run around, and was very keen for its milk. On July 6th, when I saw the calf again, I was surprised to find the hind extremities, especially around the base of the tail, a mass of maggots. A closer examination showed that the maggots were most abundant around the anus and base of the tail where some of them had eaten into the flesh to the depth of about a quarter of an inch. No adult flies were observed though a watch was kept for some time. Learning the calf's condition, the owner killed it immediately and a piece of the infested flesh was brought to the laboratory. On July 12th the larvæ appeared to be thriving, but as other work compelled an absence of about a fortnight from the laboratory at Strathroy, most of the larvæ died through want of food during this absence. Two larvæ pupated on August 5th, and on August 19th two adults of *Lucilia sericata* Meigen emerged. The specimens were dwarfed owing to the larvæ having suffered from lack of nutrition.

The adult flies had no doubt been attracted by the filthy hind quarters of the sickly calf and had oviposited there. Dr. C. Gordon Hewitt, to whom the specimens were submitted, states that *L. sericata* is the chief fly which produces the maggots on the backs and hind quarters of sheep in Great Britain, as MacDougall has shown. Such a case of myiasis occurring in cattle, however, is very unusual.

*Contributions from the Entomological Branch, Department of Agriculture, Ottawa.

December, 1914

A NEW SARCOPHAGID SCAVENGER FROM MONTANA.*

BY RALPH R. PARKER, M.S., AMHERST, MASS.

Sarcophaga cooleyi, n. sp.

Plate XXVI; figures 1, 2, 3 and 4.

Type, ♂ and ♀: Massachusetts Agricultural College.

Paratypes, ♂ and ♀: Massachusetts Agricultural College, four; United States National Museum, four; Montana Agricultural Experiment Station, six; collection of Dr. J. M. Aldrich, two; collection of writer, eight.

This species is rendered especially easy to separate from other North America members of the genus by the lack of marginal bristles on the third abdominal segment. *S. kellyi*, a much smaller species recently described by Prof. J. M. Aldrich (Journal of Agricultural Research, vol. 2, No. 6, Sept. 1914, pp. 443-445) is the only other native species with which the writer is acquainted that also lacks these bristles. The two species are at once differentiated by the presence of presutural acrostichal bristles and three rows of black cilia behind the eyes in *S. kellyi* Ald., while *S. cooleyi* lacks these bristles and has but two rows of cilia. Of the males *S. kellyi* has a grayish pollinose first genital segment, tinged with the reflecting colours of the abdomen, but the corresponding segment of *S. cooleyi* is dull orange, at most slightly grayish pollinose anteriorly. The female of *kellyi* has three sternopleurals, that of *cooleyi* four.

Length: 7 to 13 mm.; average 10 to 12 mm.

Male Head:—Viewed from side parafrontals and genæ with dark reflections. Breadth of front at narrowest part about three-fifths eye width; cheek height approximately one-half that of eyes. Front prominent, upper inner orbits of eyes converging downward; sides of frontal vitta not drawn in at base and usually converging backward by slight curves. Second antennal segment dark, its tip sometimes slightly brownish; third segment two and one-half times length of second; arista plumose on basal one-half to two-thirds. Back of head somewhat convex, with two rows of black cilia behind eyes, otherwise clothed with whitish, silvery white, or sometimes faintly yellowish hair. Cheeks clothed with black

*Contribution from the Entomological Laboratory of the Massachusetts Agricultural College.

hair. That half of genæ nearest eye-orbits with scattered hairs arranged in two or three irregular rows, a few stouter ones just above transverse impression. Palpi dark.

Chætotaxy.—Lateral verticals absent; vibrissæ inserted just above line of oral margin.

Thorax.—Vestiture of metanotum consisting of short, slightly reclinate, bristly hairs. Sutural ridge with a few scattered hairs behind last notopleural bristle. Hairs covering anterior spiracle mostly yellowish gray, but their bases dark forming an irregular band; those on anterior margin of posterior spiracle dark brown; spiracular cover pale yellowish. Epaulets dark.

Wings.—Bend of fourth vein normally a little less than a right angle; anterior cross-vein much more basal than end of first longitudinal; third vein bristly; costal spine vestigial; section V of costa about one half length of section 3; alulæ fringed with hair; calyptræ whitish, outwardly fringed with white hair.

Legs.—Dark. Posterior trochanter hairy, without a distinct "brush"; in profile a slender spine can often be seen distally on the ventral surface but is usually obscured by hair and may be absent; femur sub-spindle shaped, sometimes very slightly arched, clothed beneath with long, fine hairs that both anteriorly and posteriorly form a sort of beard, anterior face with three rows of bristles, those of the intermediate row short and stout, not present distally; tibia usually slightly curved, anterior and posterior faces each with a beard of equally dense, long, coarse, black hairs on distal four-fifths; tarsus shorter than tibia, the fourth segment longer than one-half-fifth. Middle coxa with a single row of bristles; femur clothed beneath on proximal one-half to two-thirds with a beard-like growth of long, fine hairs, anterior ventral row of short, scattered bristles complete, posterior row represented only by a distal comb extending proximally to the long hair. Anterior coxa with two rows of bristles.

Chætotaxy.—Anterior dorsocentrals strongly reclinate, but projecting well above short vestiture of prescutum; acrostichals absent, though most posterior pair is rarely weakly developed; inner presuturals absent, or if present inconspicuous; four or five pairs of postsutural dorsocentrals, two posterior pairs that are long

and two or three anterior that are short and weak; prescutellar acrostichals present: scutellar apicals present; three sternopleurals: lower sternopleurals consisting of a single row of strong bristles and numerous other irregularly placed bristles anterior to it.

Abdomen.—Somewhat conical, clothed above with short decumbent bristles, beneath with short almost erect hair. Ventral plates, as a whole, with their sides converging posteriorly, the first bearing long erect hairs, vestiture of second and third short and decumbent except at sides and posterior margin, first usually trapezoidal, its sides slightly converging posteriorly. Fourth plate prominent, in profile its base with a large somewhat conical elevation posteriorly, posterior inner edges of lamellæ bent inward and each with a "brush" of very densely set, short, stout, blunt spines on proximal half.

Chætotaxy.—Second and third segments without marginal bristles, fourth with a complete row ending ventrally at forward turn of margin.

Genital Segments.—Prominent, dull orange. First, usually concealed to just beyond "humps"; in profile slightly convex; faintly yellowish pollinose dorsally, anterior portion including "humps" sometimes slightly darkened, rarely the entire segment; clothed with short hair, "humps" bare; marginal bristles present, three to five on each side of centre: second, rotund, not flattened; vestiture longer than that of first; anal area of medium size, extending upward at least to centre of posterior surface. Forceps darkened, inner edges of prongs approximated to about the middle then slightly separated; tips blackish, bent forward and slightly spread apart; clothed with short hair nearly to prong tips, longest at sides; base with upward flap-like extensions.

Genitalia.—Head of penis large, distinctly marked off from base on posterior surface by a narrow band of membrane. Accessory plates hairy.

(♀) Females differ from males in the following important points:

Head.—Breadth of front at narrowest part slightly greater than eye width. Inner orbits of eye on upper part of front diverging downward.

Chætotaxy.—Lateral verticals and two orbital bristles present.

Thorax.—Sutural ridge bare.

Wings.—Angle formed by bend of fourth vein slightly more acute than in male.

Legs.—Vestiture throughout of short hair. Spine of posterior trochanter distinct, anterior face of femur with but two rows of bristles, an upper and lower, a few bristles proximally and posteriorly on ventral face. Middle femur with "comb".

Chætotaxy.—Scutellar apicals absent; four sternopleurals; lower sternopleurals fewer and anterior ones more distinctly bristly.

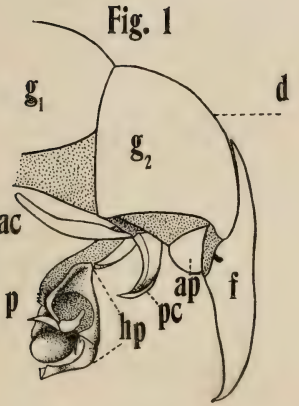
Abdomen.—Oval; vestiture throughout of short reclinate bristles. Posterior margins of ventral plates each with a row of bristles.

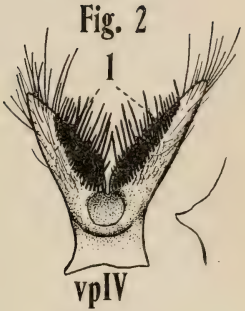
Genital Segments.—Protuberant. First segment consisting of two lateral lips that converge dorsally meeting in a slight depression and ventrally are separated by fifth ventral plate which they sometimes overlap, on dorsal half their edges with a row of close set, strong bristles that converge backward and downward, tips of uppermost usually crossing, each bears short hairs just in front of posterior edge, spiracles slightly above centre. Spiracles of fifth segment plainly visible.

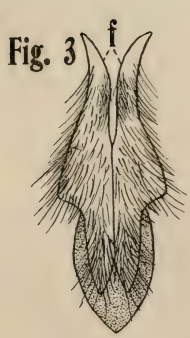
Described from 13 ♂ and 13 ♀ specimens. About 500 examined.

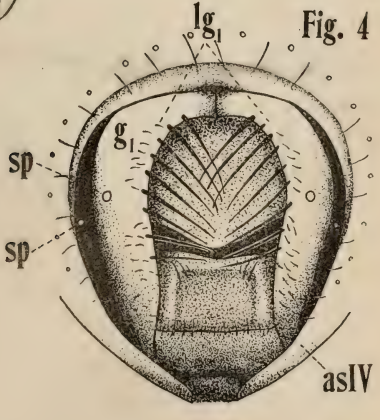
Range.—Collected at Laurel and in the Bridger Mountains, Montana.

The colour of the parafrontals and genæ is usually faintly aurichalceous, sometimes silvery gray, the deeper reflections when viewed from the side vary from brown to deep gray. In a single male specimen the lateral vertical bristles were weakly developed. The abdomen of ♂ often appears more oval than conical, but the latter is more typical. Ordinarily the vestiture of the second ventral plate is decumbent like that of the third, but occasionally may be a little more erect. As seen when the abdominal segments are in their normal position the sides of the second and third ventral plates appear almost straight, but when the segments are separated, as so often happens when the genital segments are being pulled forth and fixed in position, these two plates are fully exposed; they then appear subcircular. The membranous area at









SARCOPHAGA COOLEYI, N. SP.

the base of the lamellæ of the fourth ventral plate is very prominent forming the posterior face of the somewhat conically raised extremity of the base. The "brushes" of the lamellæ are prominent even when the genital segments are in their normal position, and may be seen filling in the space between the forceps and the ventral portion of the fourth notum. The marginal bristles of the third abdominal segment which are present in most species of Sarcophaga, are lacking, though sometimes a few, short, decumbent bristles may be discerned. If the penis is examined a weakly chitinized projecting process is seen extending upwards from the dorsal, distal portion. This bends abruptly forward and divides in to a Y. When specimens are fresh, a profile view shows this process raised above the penis head, but when dry it is often applied to it. The four sternopleurals of the female are distinctive.

S. cooleyi is very closely related to an undescribed species, the same mentioned by Dr. Felt in his annual report for 1912 (New York State Museum Bulletin 165, pp. 80-82), under the name of *S. georgina* Weid., a synonym of *S. hæmorrhoidalis* Meig. This undescribed species has a wide distribution throughout the United States.

While engaged on investigation for the Montana State Board of Entomology during the past summer, the writer bred this species extensively from decomposing fish. It was also captured in privies and was common around garbage, especially if the latter contained fish. In one experiment, in which two hundred larvæ were used to determine the length of the larval stages, not a single adult emerged but numerous chalcid parasites were raised from the pupæ.

Explanation of Plate XXVI.

(All drawings made with camera lucida).

Fig. 1. Side view of genital segments of male showing penis forceps, anterior and posterior claspers accessory plate.

Fig. 2. Ventral view of fourth ventral plate and profile view to show elevation at posterior extremity of base.

Fig. 3. Posterior view of forceps.

Fig. 4. Genital segments of female (made from a specimen with genital segments partly expanded).

ac. Anterior claspers.
ap. Accessory plate.
as IV. } Fourth and fifth abdominal segments.
as V. }
bvp. IV. 'Brush' of fourth ventral plate.
d. Dorsal limit of anal area.
f. Forceps.
fpg. Forceps prong.
g. 1. First genital segment.
g. 2. Second genital segment.
hp. Head of penis.
l. Lamellæ of fourth ventral plate.
lg. l. Lips of first genital segment (♀).
p. Penis.
pc. Posterior claspers.
sp. Spiracle.
vp. IV. Fourth ventral plate.

A NEW ELACHISTID MOTH FROM MANITOBA.*

BY ARTHUR GIBSON,
Chief Assistant Entomologist, Department of Agriculture, Ottawa.

Among some micros collected at Aweme, Man., by Mr. Norman Criddle, Field Officer of the Dominion Entomological Service, are two specimens of a species of *Heliodines*, of the family Elachistidæ, which is undescribed. The specimens were reared by Mr. Criddle from larvæ found feeding on *Oxybaphus nyctagineus*, a widely occurring representative of the *Nyctaginaceæ* in Canada. I therefore propose the name:

Heliodines nyctaginella, sp. nov.

Antennæ dark metallic grayish-purple. Palpi pale yellow, tipped with black. Face, head and thorax blackish, shining; thorax with greenish reflections. Fore-wings bright golden-orange, with nine metallic bluish-gray, more or less elongate, spots, six costal and three dorsal, all edged with black basally. Base of costa and margin of dorsum to first dorsal spot black. Space

*Contributions from the Entomological Branch, Department of Agriculture, Ottawa.

December, 1914

between first and second costal spots mostly black, particularly at costa and not so wide as space between third, fourth, fifth and sixth spots, which are equidistant. The first dorsal spot is opposite the space between the second and third costal spots, the second dorsal between the third and fourth costal spots and the third dorsal between the fourth and fifth costal spots; apex from last costal spot and edge of dorsum to last dorsal spot black. In this margin of black there is a conspicuous band of metallic blue-gray scales. Cilia brown. Hind wings bronzy-brownish; cilia brown. Abdomen and legs blackish with bronzy-green reflections.

Alar expanse 10 mm.

Habitat:—Aweme, Man., July, 1913 (Norman Criddle). Type deposited in collection of Entomological Branch, Department of Agriculture, Ottawa; paratype deposited in U.S. National Museum, Washington.

As to the placing of the species in the genus *Heliodines*, Mr. Busck, who kindly examined the specimens, states that "the species may be described as *Heliodines*, though differing from the type of this genus *H. roesella* Linn., of Europe, in having the apical veins in forewings separate, not stalked. In this character the species agrees with the closely allied genera *Lamprolophus* Busck, and *Embola* Walsm., but both of these have pectinated posterior tibiæ and this character has probably more weight in this group than the slight difference in the venation."

H. nyctaginella has smooth tibiæ like *H. roesella*. It comes nearest to *H. albaciliella* Busck, being nearly identical in markings but much smaller and without the white cilia in the hind wings.

During the past season Mr. Criddle sent me larvæ of *H. nyctaginella*, from which the following note was made:

Mature Larva—Length 6 mm., dull green, darker dorsally. Thoracic shield black, pale stripe in centre. Anal shield blackish. Tubercles blackish each in a pale circle; single-haired; setæ dark. Feet pale. Head pale brown, marked outwardly with black.

The first moth emerged July 17, and others up till July 24. These specimens have been compared with the type and no apparent variation occurs.

THREE NEW SPECIES OF TRYPETIDÆ FROM COLORADO.*

BY F. L. THOMAS, AMHERST, MASS.

While working upon the Trypetidæ of New England, I had the opportunity of examining much western material. In that loaned by Mr. Charles W. Johnson, Curator of the Boston Society of Natural History, there were three specimens from Colorado, which are described below as new species. The types are located in Mr. Johnson's private collections.

Eutreta simplex, n. sp.

Type—One female from Colorado.

Brown; face without black spots. Wings broad, reticulate, with a white crescent seaming the tip. Scutellum with four bristles. Posterior basal cross-vein obtusely angled; small cross-vein two-thirds along the discal cell; third vein with bristles on the under surface of the wing. Length ♀ 6.5 mm., wing 5 mm.

Head—Front pale brown, slightly tapering, and about one-third the width of the head. Three lower frontals; the second pair of upper frontals, the post-vertical and outer vertical bristles white; cilia of the posterior orbit consisting of coarse white and fine black bristles. Epicephalon (that portion above the neck) yellow and dark brown, the remainder of the cephalon lighter brown. Eyes large, oval, with no traces of any transverse stripes. Cheeks narrow with brown bristles. Oral margin projecting and slightly arcuate. Face pale yellow without black spots, hollowed. Antennæ yellowish brown, reaching nearly to the oral margin; third segment with distinct but not a sharp anterior corner; second segment with a distinct pale spine. Arista with black bristle and brown base.

Fig. 33—*Eutreta simplex*, wing.

Thorax—Brown; blackish on the notum, metanotum, and sternopleuræ. Short hair whitish; bristles dark brown. First pair

*Contribution from the Entomological Laboratory of the Massachusetts Agricultural College.

December, 1914

of dorso-central bristles close to the transverse suture. Scutellum bearing four bristles, the apical pair being weaker. Halteres yellow.

Abdomen—Brown, becoming darker toward the posterior; the anterior lateral portions are yellowish. Short hair whitish. Macrochætæ black and prominent; Genital segment broad, flat, and yellowish, with a short dark brown stripe on the middle of the base; as long as the last two abdominal segments taken together.

Legs—Yellowish brown with a dark stripe on the under side of each of the hind femora. Fore femora not thickened. Hind tibæ with short strong bristles. Bristles black.

Wings—Broad, reticulate with a white crescent seaming the tip from the second vein to near the middle of the second posterior cell. The reticulation is made up of nearly uniform hyaline dots rather evenly scattered, but wanting in that part of the grayish-brown color which adjoins the white crescent. Stigma darker with two small light coloured spots, the one in the apex being larger and more noticeable. Second vein with a slight convexity above the small crossvein.

Hab—Sunset, Colo., July 13, 1913; collected by Van Duzee at an altitude of 8,000 feet.

This specimen closely resembles *Eutreta sparsa*, but differs principally in not possessing black spots on the face, in having larger hyaline spots on the wing with a light coloured spot in the stigma and without a small clear stripe at the tip of the first longitudinal vein.

Acidia johnsoni, n. sp.

Type—One female from Colorado.

Head pale yellow; thorax and legs yellowish gray; abdomen black with posterior borders of the segments yellow. Wings banded with dark brown; the spaces whitish hyaline. Scutellum with two bristles. Posterior basal cross-vein obtusely angled. Small cross-vein slightly beyond the middle

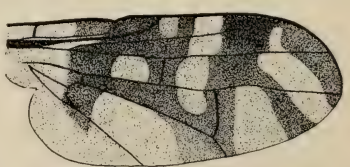


Fig. 34—*Acidia johnsoni*, wing.

of the discal cell. Third vein without bristles. Length, ♀ 5 mm., wing 4 mm.

Head—Front tapering, but more than one-third the width of the head. Two weak lower frontals; all bristles and hair of the insect are pale yellow or white. Cheeks rather broad. Oral margin slightly projecting and strongly arcuate. Face whitish with shallow antennal grooves. Antennæ missing.

Thorax—Gray; bristles and short hair yellowish. First pair of dorso-central bristles about one-fourth from the transverse suture to the scutellum. The latter is flat and bears two bristles. Metanotum shining black. Halteres yellow.

Abdomen—Black, the posterior borders of the separate segments yellow. On the median line of the last abdominal segment the yellow colour approaches half way to the base. Macrochætæ white and short. Genital segment shining black, heavy conical, constricted, as long as the last two abdominal segments taken together.

Legs—Coxæ yellowish gray; femora gray, yellowish at the tips; tibiæ and tarsi yellow. Hind tibia without a distinct row of short strong bristles.

Wings—Distal portion of wings with two whitish hyaline indentations, separated by a dark oblique cross-band, which is emitted from another dark brown band crossing the wing and covering the posterior cross-vein. The apex of the wing is bordered to a little beyond the fourth vein by a dark band, which is narrowly connected anteriorly with the band crossing the wing. The band crossing the wing is connected along the fifth vein with the dark area in the proximal half of the wing. This area extends from the costa posteriorly to the fifth vein and across the base of the third posterior cell, and contains two whitish hyaline spaces. One is in the marginal cell just beyond the tip of the first longitudinal vein; the second is in the first basal cell below the stigma. The base of the wing is whitish hyaline. In the figure the whitish hyaline spaces are too dark.

The generic location of this species is doubtful.

Urellia apicata, n. sp.

Type—Female from Colorado.

Brown; wings hyaline with radiating picture in the apex, stigma coloured. Scutellum with four bristles. Posterior basal cross-vein right angled; small cross-vein two-thirds along the discal cell; third vein with bristles. Length ♀ 6.5 mm., wing 6 mm.

Head—Front yellowish brown, of uniform width and one-third as wide as the head. Lower frontals varying in size and number, four on one side and five on the other; all bristles brown and more or less pale, cilia of posterior orbit also pale. Cephalon brown. Cheeks rather broad. Oral opening large, margin not projecting. Face retreating, slightly hollowed and clay-yellow. Antennæ short, reaching two-thirds to the arcuate oral margin, third segment with rounded anterior corner; second segment with minute spine; arista brown.

Fig. 35—*Eurellia apicata*, wing.

Thorax—Brown; bristles brown, short hair yellowish. First pair of dorso-central bristles one-third from the transverse suture to the scutellum. The latter flat and bearing four bristles, the middle pair being a little the shorter. Halteres brown.

Abdomen—Dark brown, shining; short hair, dark brown. Macrochætæ prominent, brown. Genital segment of the female broad, flat, and brown tipped with black; as long as the last two abdominal segments taken together.

Legs—Light brown with bristles of the same colour. Hind tibia with row of short strong bristles, fore-femora strongly armed as usual.

Wings—Hyaline with the fuscous area in the apex beyond the hind crossvein and above the fourth vein; stigma fuscous. Running posteriorly from the black spot are three rays, two crossing the second posterior cell and one covering the hind cross-vein. The dark area contains two large and three small hyaline spots; a large one just beyond the tip of the second vein

and reaching to the third vein, with a small spot each side on the costal margin; the other large spot is directly below in the first posterior cell on the fourth vein with a small spot on the proximal side.

Hab.—Colorado.

This specimen which has the characteristic wing picture of the genus *Urellia*, differs considerably in structure from other members of that genus which have been examined. Among the constant characters for species having four or two bristles on the scutellum are the following: three lower frontal bristles, narrow cheeks, first pair of dorso-central bristles close to transverse suture, macrochætæ weak, hind tibia without a row of short strong bristles, posterior basal cross-vein obtusely angled, small cross-vein three-fourths along the discal cell, and the third vein bare. The structure of *Urellia apicata* differs from these characters as follows: four or five lower frontal bristles, broad cheeks, first pair of dorso-central bristles one-third from the transverse suture to the scutellum, macrochætæ prominent, hind tibia with a row of short strong bristles, posterior basal cross-vein right angled, small cross-vein only two-thirds along the discal cell, and the third vein with bristles.

THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The Fifty-first Annual Meeting of the Entomological Society of Ontario was held at the Royal Canadian Institute, Toronto, on Thursday and Friday, November 5 and 6, 1914—Dr. C. Gordon Hewitt, President of the Society, occupying the chair throughout the sessions.

Among the members present were Prof. J. H. Comstock, Cornell University, Ithaca, N. Y.; Rev. T. W. Fyles, Ottawa; Dr. C. G. Hewitt, and Messrs. A. Gibson and J. M. Swaine, Entomological Branch, Ottawa; Messrs. N. Criddle, W. A. Ross, E. H. Strickland and H. F. Hudson, Field Officers of the Branch; Rev. Prof. C. J. S. Bethune, Prof. L. Caesar and Mr. A. W. Baker, O. A. College, Guelph; Prof. W. Lochhead, Macdonald College, Que.; Prof. J. Dearness, London; Dr. A. Cosens, Prof. E. M. Walker and Messrs. J. B. Williams, A. Smith, C. Snazelle, E. H.

Craigie, Geo. Duff and S. Logier, Toronto; Mr. F. J. A. Morris, Peterborough; Mr. J. Evans, Trenton; Prof. W. H. Brittain, Truro, N. S.; and Mr. Vernon King, Charleston, Mo.

Among the visitors were Prof. C. R. Crosby, Cornell University, Ithaca, N. Y.; Mr. J. C. Chapais, St. Denis-en-bas, Que.; Rev. Father Leopold, La Trappe, Que., and Messrs. A. B. Baird and S. H. Hord, O. A. College, Guelph.

On Thursday morning a meeting of the Council was held in the University Biological Building, at which the report of the proceedings during the past year was drawn up, and several matters relative to the welfare of the society were discussed. A suggestion that the next Annual Meeting be held at Ottawa was afterwards put before the General Meeting of the Society and adopted.

The regular proceedings commenced at 2 p.m. in the Lecture Room of the Royal Canadian Institute, and the interest felt by those present in the varied programme was shown by the lengthy discussions which followed many of the papers. The first order of business was the reading of the Reports of the Directors on the insects of the year. Reports were presented by Mr. A. Gibson, Ottawa; Mr. C. E. Grant, Orillia; Dr. A. Cosens, Toronto; Mr. F. J. A. Morris, Peterborough, and Mr. W. A. Ross, Jordan Harbour. These Reports contained an unusual number of interesting observations. Dr. Hewitt, the President, then read the Annual Address, which was a very able and complete account of the rise and progress of Applied Entomology in Canada, and will form a most valuable contribution to our literature of the history of Canadian Entomology. Appreciative remarks upon this address were made by Dr. Bethune and Dr. Fyles, after which a valuable Paper on the Insects of the Season in Ontario was presented by Prof. Caesar. Considerable discussion followed this paper, particularly on the work of the Tarnished Plant Bug and other capsids in orchards and nursery stock and the methods for their control.

On Thursday evening a Public Meeting was held in the Lecture Hall of the University Biological Building, and was well attended, many members of the University staff and that of the

various Collegiate Institutes and of the Royal Canadian Institute having been noticed in the audience.

The President, Dr. Hewitt, introduced the lecturer, Prof. J. H. Comstock, of Cornell University, who gave a most interesting and stimulating address on the "Habits of Spiders," a subject upon which there is probably no one more competent to speak. The lantern illustrations, made from Prof. Comstock's own photographs, were extraordinarily fine examples of insect photography. A vote of thanks, proposed by Prof. Lochhead and seconded by Prof. Dearness, was extended to Prof. Comstock for his instructive and entertaining address. After the lecture an informal gathering took place, at which refreshments were served and a pleasant chat enjoyed by the members and visitors.

On Friday morning the meeting was resumed and continued until late in the afternoon. The Reports of the Council and of the various Officers and Branches of the Society were read and adopted. No Report of the Delegate to the Royal Society was received, owing to the unfortunate death of Mr. Henry H. Lyman, who had been appointed in that capacity. The election of Officers, which then followed, resulted in the re-election of all the officers of the past year, with the exception of the Delegate to the Royal Society, for which Prof. Lochhead was chosen. Two new members were elected—Mr. J. C. Chapais, St. Denis-en-bas, Que., and Rev. Father Leopold, La Trappe, Que.

The following papers were read: "Injurious Insects of Quebec in 1914" and "The Work of Henri Fabre," by Prof, W. Lochhead; "The Outbreak of the Army Worm in Canada in 1914," by Mr. A. Gibson; "The Army Worm in Ontario," by Mr. A. W. Baker; "Variation in Colour of the Bristles of the Hedgehog Caterpillar," *Isia isabella*, by Mr. Gibson; "Mountains and Hills," by the Rev. Dr. Fyles; "Forest and Shade Insects of the Farm," by Mr. J. M. Swaine; "An Imported Red Spider attacking Fruit Trees," and "Cherry Fruit Flies," by Prof. L. Caesar, and "Locust Control in Eastern Canada." by Mr. Gibson.

Special mention should be made of the great pleasure felt by everyone present in listening to Dr. Fyles' charming paper, which

was read by the venerable author himself in his delightful and inimitable style.

The following is a list of the officers of the Society for the ensuing year:—

PRESIDENT—C. Gordon Hewitt, D.Sc., F.R.S.C., Dominion Entomologist, Entomological Branch, Ottawa.

VICE-PRESIDENT—Mr. A. F. Winn, Westmount, Que.

SECRETARY TREASURER—Mr. A. W. Baker, B.S.A., Lecturer in Entomology, O. A. College, Guelph.

CURATOR—Mr. G. J. Spencer, B. A., O. A. College, Guelph.

LIBRARIAN—Rev. Prof. C. J. S. Bethune, M.A., D.C.L., F.R.S.C., Professor of Entomology and Zoology, O. A. College, Guelph.

DIRECTORS—Division No. 1: Mr. Arthur Gibson, Entomological Branch, Ottawa. Division No. 2: Mr. C. E. Grant, Orillia. Division No. 3: Dr. A. Cosens, M.A., Ph.D., Parkdale Collegiate Institute, Toronto. Division No. 4: Mr. C. W. Nash, Provincial Biologist, East Toronto. Division No. 5: Mr. F. J. A. Morris, Peterborough. Division No. 6: Mr. R. S. Hamilton, Collegiate Institute, Galt. Division No. 7: Mr. W. A. Ross, Jordan Harbour.

DELEGATE TO THE ROYAL SOCIETY OF CANADA—Prof. Wm. Lochhead, Professor of Biology, Macdonald College, Que.

AUDITORS—Prof. J. E. Howitt, M.S.A., and Prof. L. Caesar, B.A., M.S.A., O. A. College, Guelph,

CHANGE OF ADDRESS.

Mr. E. P. Van Duzee wishes to call the attention of his correspondents to his recent change of address to "Department of Agriculture, University of California, Berkeley, California."

THE WAVY STRIPED FLEA-BEETLE
(*Phyllotreta sinuata* Steph.)

BY E. MELVILLE DUPORTE, MACDONALD COLLEGE, QUE.

The fact that this insect has not before been reported as a pest in Canada serves as an excuse for the publication of a short note concerning it.

Phyllotreta sinuata is an introduced species and is generally distributed throughout England and the continent of Europe. Horn in 1889 describes it as occurring in America from the New England States to Georgia and westward to Missouri. Sanderson states that in the Middle States the larvæ mine in the leaves of wild pepper grass (*Lepidium virginicum*) and Professor Blatchley informs me that it is a very common species throughout Indiana.

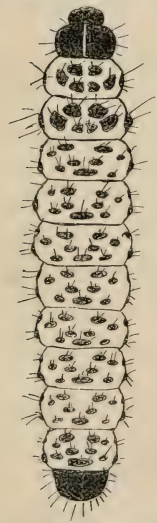


Fig. 36—*Phyllotreta sinuata* Steph., larva.

My attention was first drawn to the insect in June, 1913, when the larvæ were observed mining in the leaves of cress and feeding on the foliage of radish. The adults were obtained by rearing these larvæ and were also collected in the field. The cress was practically destroyed by the beetle and its larvæ.

The insect is again present at Macdonald College this season feeding on radish, turnips and cabbage. It is often associated with the turnip flea-beetle (*Phyllotreta vittata* Fab.) and it is probably owing to its close resemblance to this species that it has escaped detection, for recently, in examining a collection of *P. vittata* which was made in 1912, I found several specimens of *P. sinuata* which I had not noticed at the time they were collected.

The larva of *P. sinuata* is a small eruciform grub, about 4 mm. long. The head and pronotum are dark brown, the latter being crossed by a light-coloured median line. The second and third thoracic segments as well as the first eight abdominal segments bear several brown setigerous tubercules of various sizes. The last abdominal segment is deep brown or black and fringed

with lighter coloured setæ. The general colour is green, owing to the chlorophyll of the leaf on which it feeds.

The pupa is yellow and is found in a small cell in the soil around the affected plants.

The adult is an elongate oval beetle, piceous. Elytron with narrow yellow sinuate vitta. Head punctulate, thorax and elytron punctate. Antennæ not quite half as long as body, joint 4 in the male equal in length but much wider than joint 2 or 3, joint 5 longer than the preceding two and much dilated. Except for the broad post-humeral branch, the vitta is almost uniform in width throughout; the distal portion is usually very slightly wider than the middle portion, but quite often the width is practically uniform throughout; the proximal portion of the vitta does not bend towards the suture, but is almost parallel to it.

Length 2.5 mm.

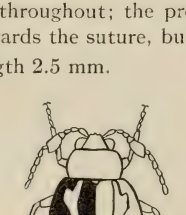


Fig. 37—*Phyllotreta sinuata* Steph., male.

Fig. 38—*Phyllotreta vittata* Fab., male.

The following are the chief points of difference between *P. sinuata* and *P. vittata*.

1. *P. sinuata* is larger, measuring 2.5 mm., while *P. vittata* is 2.0 mm. long.

2. In *sinuata* the length of the antennæ is quite equal to half that of the body, but in *vittata* it is somewhat greater.

3. The fifth antennal joint of the male in *sinuata* is very much broader than the preceding joint and slightly longer than the combined length of joints 3 and 4, while in *vittata* the corres-

ponding joint is but slightly broader than the preceding ones and not as long as joints 3 and 4.

4. In *sinuata* the basal portion of the vitta is nearly parallel to the suture, and the middle portion very little or not at all narrower than the distal, while in *vittata* the basal portion bends towards the suture and the middle portion is decidedly narrower than the distal.

5. In *sinuata* the prothorax is twice as wide as it is long, while in *vittata* its width is only about one-third greater than its length.

A SPECIES OF MEGASTIGMUS REARED FROM LARCH SEEDS.*

BY S. MARCOVITCH, ITHACA, N. Y.

On September 10, 1913, the seeds of the larch trees, *Larix laricina* Du Roi, around the Cornell insectary, Ithaca, N. Y., were found to be infested by a white larva. The seeds were kept indoors during the winter, and on April 2, 1914, the first adults of a species of Megastigmus emerged. The larva completely devours the kernel, and fills the entire seed making it difficult to open one without injuring the larva. Examined on July 17, the larvæ were nearly two-thirds grown. That it feeds on the kernel as do all of the known American forms of this genus is quite conclusive, since only one kind of larva was found in the seeds. This species is apparently undescribed.

Megastigmus laricis, n. sp.

Female.—Length 2.1 mm.; abdomen 1 mm.; ovipositor 1.6 mm. General colour black; face, front nearly to base of the antennæ yellowish; occiput, antennal grooves, and vertex, black; posterior eye-margin and cheeks, dark brown. Prothorax black, and finely rugulose. Anterior portion of mesonotum smooth, posterior part with fine transversely curved striæ. Scutellum finely rugulose. Propodeum finely reticulate-punctate with a medium longitudinal carina, which is broken in the middle. Antennæ brown, scape yellowish. Anterior coxæ yellow; middle coxæ brownish yellow; posterior coxæ black; rest of legs brownish yellow, except femora,

*Contribution from the Entomological Laboratory of Cornell University.
December, 1914

which are brownish black, but lighter at the tip. Wings hyaline. Abdomen shining black, sometimes with three indistinct yellow spots on the sides. Ovipositor brownish black.

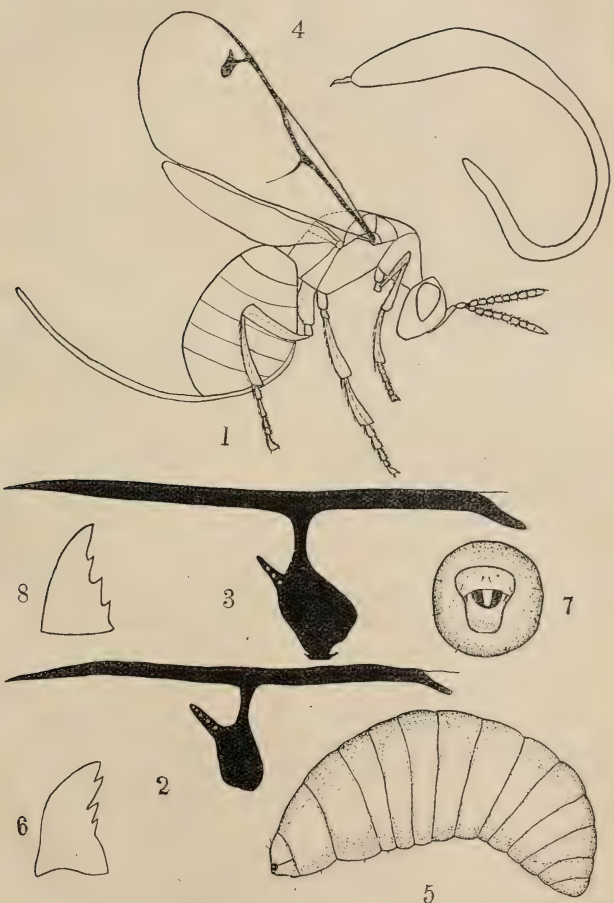
Male.—Length 2.5 mm.; abdomen 1 mm. Vertex and occiput black; face, cheeks and upper portion of front, yellow; portion bordering the upper posterior angle of the eye brownish. Whole dorsal aspect of thorax black. The brownish spot on the sides of the prothorax somewhat rectangular, and more distinct than in the female. Antennæ brownish, scape yellow. Front coxæ yellow; middle coxæ brownish, black towards base; hind coxæ black. Legs yellowish. Stigmal club somewhat truncate behind. Propodeum finely reticulate-punctate with an indistinct longitudinal median carina. Abdomen brownish black, lighter beneath.

Larva.—Length 2.1 mm.; width 9 mm. Colour dull white, middle segments a little darker. The mandibles are brownish, and armed with four teeth (Fig. 6). Supporting the mandibles is a thick fleshy labium, thicker on the caudal end. The larva is sparsely clothed with short setæ.

Egg.—The egg as obtained by dissection of the female is white, smooth, and spindle-shaped, with a long pedicel at one end, and a vestige of one at the opposite end. Length of body of egg .22 mm.; tail-like process .44 mm.; vestige .031 mm.

Described from 15 females and 12 males, Ithaca, N. Y., July 17, 1914. Types deposited in the Cornell University collection.

Specimens were compared with *Megastigmus atedius* Walker in the Oxford Museum by C. O. Waterhouse. The latter is 4 mm. long; the striæ of the thorax are coarser, and the stigmal club is nearly circular. Specimens were also compared with *Megastigmus japonicus* and *Megastigmus koebelei* Ashmead, by J. C. Crawford in the U. S. National Museum. *M. japonicus* is entirely yellow. The striæ of the mesonotum are coarser and straight. They are much more strongly elevated than in *laricis*, and continue across the parapsoidal areas. *M. koebelei* has the dorsum of the thorax green, with the transverse striæ much coarser. The parapsoidal furrows are indistinct, and the apical part of the scutellum has a finer sculpture than the basal part.



MEGASTIGMUS LARICIS, N. SP.

According to Crosby's table of the North American species of Megastigmus (Ann. Ent. Soc. Am., VI, p. 156, 1913) this species runs down to *M. lasiocarpi* Crosby. I have rearranged his table to include the present species as follows.

TABLE OF SPECIES (FEMALES).

1. Ovipositor not longer than abdomen....2
   Ovipositor longer than abdomen....3
2. Stigmal club oval ....*brevicaudis*
   Stigmal club elongate ....*physocarpi*
3. Front wings marked with a brownish spot adjoining the hind margin of the submarginal vein....*albifrons*
   Front wings not so marked....4
4. Stigma surrounded by a clouded area....*nigrovariegatus*
   Stigma not surrounded by a clouded area....5
5. Mesonotum black, with an oblong reddish orange area covering the posterior half of the middle lobe, the inner angles of the scapulæ and axillæ and all of the scutellum....*pinus*
   Not so marked....6
6. Black species....7
   Yellow species....9
7. Pronotum with two yellow spots....*tsugæ*
   Pronotum black without yellow spots....8
8. An elongate yellow spot on each side of the prothorax; length 3.7 mm. ....*lasiocarpi*
   Sides of prothorax black; length 2 mm....*laricis*
9. Axillæ yellow; stigmal vein as long as the club is wide ....*spermotrophus*
   Axillæ black except inner angle; stigmal vein shorter than width of the club....*aculeatus*

In the fall of 1913 I also found the larva of *Megastigmus physocarpi* Crosby in the seeds of *Physocarpus opulifolius* at Ithaca, N. Y. It is similar in form to the larva of *M. laricis*, and measures 1.9 mm. long by 8 mm. wide. The mandibles have four teeth (Fig. 8).

EXPLANATION OF PLATE XXVII.

1, *M. laricis*, female; 2, stigmal club of female; 3, stigmal club of male; 4, egg; 5, larva; 6, mandible of larva; 7, head of larva from in front; mandible of larva of *M. physocarpi*.

Index to Volume XLVI.

Acalles ventrosus, 250.
Acanthocephala, synonymic note on, 378.
Acidaliodes eoides, 28, 179.
Acidia johnsoni, n. sp., 426.
Acolomorpha minuta, n. sp., 60.
" n. gen., 60.
Aconophoroides projecta, n. sp., 405.
" *rectispina*, n. sp., 405.
Acronycta dactylina, 399.
" felina, 400.
" henrici, 400.
Acupalpus longulus, 63.
Aditoma bifida, 66.
Aeshna interrupta, nymph of, 371.
" palmata, nymph of, 372.
" tuberculifera, nymph of, 370.
" umbrosa, nymph of, 372.
Æthecerus hornii, 92.
Agapetus malleatus, n. sp., 202.
Alberta Lepidoptera, notes on, 393.
Alexander, C. P., articles by, 157, 205.
Allecula atra, 144.
Anagrus armatus, 327.
" *ovijentatus*, n. sp., 181.
" saga, 182.
Anaphoidea galtoni, 288.
Anastrepha ludens, 310.
Ancistrogaster spinax, 276.
" variegata, 276.
Ancylocera bicolor, 92.
Andrena helianthi, 409.
Anisogamus disjunctus, n. sp., 156.
" *infernalis*, n. sp., 154.
Anomis serrata, 29.
Anosia plexippus, migration of, 100.
Antonea nodosa, n. sp., 404.
Aphelinoidea semifuscipennis, 328.
Aphididæ, new and little known, 41, 77, 121, 165, 226.
Aphis pseudobrassicæ, n. sp., 231.
Aphodius campestris, 91.
" concavus, 91.
Apion lividum, 247.
Apple Maggot, poisoned bait spray for, 310.
Aresia parva, 28.
Artheneis, note on type of, 382.
Asopinæ, synonymic note on, 378.
Asopus, synonymy of, 378.
Astemma, status of, 383.
Astochus aldrichi, n. sp., 137.
" *fletcheri*, n. sp., 108.
" n. gen., 107.
Astoplectron connexa, n. sp., 265.
" n. gen., 264.
Atrichops hesperius, n. sp., 101.
Attalus zebraicus, n. sp., 90.
Australia, new genus of Scelionidæ from, 60.
Autographa, species taken from sunflowers, 146.
Axion tripustulatum, 66.

Ball, E. D., article by, 211.
Banks, Nathan, articles by, 24, 150, 201, 252, 261.
Baris æneomicans, 250.
Barnes, W., and McDunnough, J., article by, 27.
Bassareus croceipennis, 140.
" luteipennis, 4.
Bees visiting Helianthus, 409.
Bethune, C. J. S., articles by, 148, 221, 294, 298, 333.
Biological Club, London, 184.
Bird, Henry, article by, 69.
Bitter gourd fruit fly, poisoned bait spray for, 245.
Blackmore, E. H., article by, 331.
Blatchley, W. S., articles by, 61, 88, 140, 247.
Blepharida rhois, 12.
Bolbonota dubiosa, n. n., 389.
" *lutea*, n. sp., 361.
" *nigrata*, n. sp., 362.
Bombus, visiting sunflowers, 410.
Bombycia fasciata, 297.
" improvisa, 184, 297.
" tearlii, 184, 297.
Book Reviews:
Anales de Zoologia Aplicada, 298.
Braun's Evolution of the Colour Pattern in Lithocolletis, 260.
Carpenter's Life Story of Insects, 147.
Entomologist's Monthly Magazine, 297.
Folsom's Revised Entomology, 35.
Franklin's Bombidæ of the New World, 73.
Headlee and McCulloch's The Chinch Bug, 182.
Headlee and Parker's The Hessian Fly, 183.
Lochhead's Economic Entomology, 148.
Natural History of Toronto, 34.

Book Reviews (Continued)
Needham's Natural History of the Farm, 367.
Patton and Cragg's Medical Entomology, 258.
Seitz Macrolepidoptera of the World 216.
Shelford's Animal Communities in Temperate North America, 111.
Wheeler's Ants of the Genus Formica, 109.
Bothiopolys multidentatus, 301.
Brachistella prima, 328.
Branneria carinatum, 306.
Braucher, R. W., article by, 14.
Braun, Annette F., article by, 17.
Bryophila avirida, 401.
Buprestis sulcicollis, 89.
Burr, Malcolm, article by, 273.
Butler, Hortense, article by, 346.
Butterfly, a protected, 109.

Cælambus princeps, n. sp., 64.
Caesar, L., articles by, 182, 183.
Calamoceratidæ, new American, 264.
Campylenchia, synonymic note on, 388.
Canadian Entomological Service, 214.
Canadian insects, a National collection of, 251.
Canthydrus floridanus, n. sp., 63.
Capitonius ashmeadii, 321.
" *caryæ*, n. sp., 318.
" *erythrogaster*, n. sp., 317.
" key to species of, 317.
" *leptostyli*, n. sp., 319.
" *nigrisoma*, n. sp., 320.
" *provancheri*, n. n., 321.
" rugosus, 319.
" sanguiniventris, 318.
" saperdæ, 318.
" synopsis of N. Am. species of, 316.
" *tenuicornis*, n. sp., 321.
Catorama porosum, 91.
Ceratitis capitata, 243.
Cerceris angularis, n. sp., 220.
Ceresa stimulea, n. n., 388.
Chætochlorops, n. sp., 120.
Chagnon, W., article by, 296.
Chalepus scapularis, 142.
Chamberlin, R. V., articles by, 301, 314.
Chelymorpha argus, 12.
Cherry fruit flies, poisoned bait spray for, 311.
Chilopoda from Douglas Lake, Mich., 301.
Chlænius herbaceus, 63.
Chlamys nodulosa, 92.
Chloropidæ of N. America, synopsis of genera in, 113.
Chloropisca, characters of, 117.
" glabra var. *clypeata*, n. var., 119.
" *obtusa*, n. sp., 118.
Chrysanthia repanda, 144.
Chrysobothris chrysoela, 89.
Chrysochus aureus, 4.
Chrysomela bigsbyana, 8.
" elegans. 8
" philadelphica, 7.
" scalaris, 6.
Chrysomelians of Ontario, 4.
Chrysopa leptana, n. sp., 25.
" nigricornis, 308.
" oculata, 308.
" rufilabris 308.
" *rufolinea*, n. sp., 24.
" *sarta*, n. sp., 25.
Chrysophagus compressicornus, parasitic on Chrysopids, 308.
Chrysopidæ, new American, 24.
Chrysopids, parasitism of in S. Carolina, 306.
Chrysops cursim, 345.
" *ultimus*, n. sp., 345.
Cicada, synonymy of, 387.
Cimex, synonymic note on, 385.
Cingilia catenaria, var. *immacularia*, n. var., 291.
Cleora newcombi, n. sp., 290.
Cockle, J. W., articles by, 184, 332.
Cockerell, T. D. A., articles by, 32, 101, 220, 271, 409.
Cœnagrion resolutum, nymph of, 353.
Colaspis, 5.
Coleoptera, life-histories of two, 185.
Coleoptera, notes on Florida, 61, 88, 140, 247.
Conotrachelus aratus, 249.
" belfragei, 249.
Coptocycla aurichalcea, 12.
" guttata, 12.
Corizus, synonymy of, 379.
Cosens, A., article by, 180.
Cossus orc, 394.
" populi, 394.
Craneflies, Japanese, 157, 205, 236.
Craponius inæqualis, 250.
Cremastochilus squamulosus, 91.
Crosby, C. R., and Leonard, M.D., article by, 181.
Cryptocephalus bivius, 140.
" incertus, 140.
" lateritius, 140.

Cryptocephalus limbatus, 140.
" quadrimaculatus, 4.
" sanfordi, 140.
" tinctus, 140.
" venustus, 4.
Cryptococcus fagi, occurrence near Halifax, 14, 15.
Cryptorhynchus apiculatus, 250.
Currant fruit fly, use of poisoned bait spray for, 312.
Cydnus, synonymy of, 377.
Cyphon perplexus, n. sp., 89.
Cystiphora canadensis, gall of, 180.

Dacus cucurbitæ, 245.
" oleæ, 277.
Davis, J. J., articles by, 41, 77, 121, 165, 226.
Davisia singularis, 31.
Dermaptera, some Central American, 273.
Diabrotica, 10.
" vincta, 141.
Diadasia, visiting sunflowers, 410.
Diastictis loricaria, 393.
Dicælus carinatus, 63.
" quadratus, 63.
Dictenidia fasciata, 157.
Dictyophara, synonymic note on, 387.
Dinex americanus, 276.
Dineutes assimilis, positive hydrotropism of, 33.
Diplatys gracilis, 273.
" jansoni, 273.
Diplectrona californica, n. sp., 253.
Diplochila nupera, 63.
Diplopoda, from Douglas Lake, Mich., 303.
Diptera from Miocene of Colorado, 101.
Disonycha caroliniana, 11.
" pennsylvanica, 11.
Dod, F. H. Wolley, articles by, 297, 393.
Dodd, A. P., articles by, 60, 164, 293.
Dolerus græmicheri, n. sp., 107.
" *inspiratus*, n. sp., 105.
" *konowi*, n. sp., 106.
" *lesticus*, n. sp., 105.
" *tectus*, n. sp., 104.
Dolophilus breviatus, n. sp., 254.
" characters of, 254.
" *major*, n. sp., 254.
Doru bimaculatum, 276.
" lineare, 276.
Doryphora clivicollis, 6.
" decemlineata, 6.
Du Porte, E. Melville, article by, 433.
Dyar, H. G., article by, 179.
Dytiscid beetle, life-history of a, 37.

Echinopsalis guttata, 273.
Ectrichodia, synonymy of, 385.
Elachistid moth from Manitoba, a new, 423.
Elasmidæ, a new genus of, 285.
Empria costata, n. sp., 103.
Enallagma carunculatum, 351.
" ebrium, nymph of, 351.
" geminatum, nymph of, 352.
" hageni, nymph of, 350.
Ennya pulchella, n. sp., 403.
Enoclerus lunatus, 91.
Entomological Service, The Canadian, 136, 214.
Entomological Society of Ontario, Annual Meeting, 348, 429.
Entomological Society of Ontario, Montreal Branch, 292.
Eosphoropteryx thyatiroides, 145.
Epochra canadensis, 312.
Euchætias oregonensis, 398.
Euchalcia putnami, 145.
Euchloena astylusaria, 394.
Eudiagogus pulcher, 247.
Eugnamptus striatus, 247.
Eulabis suramaccensis, 274.
Eulachnus rileyi, 169.
Euparia castanea, 91.
Euryischomyia, n. gen., 285.
" *washingtoni*, n. sp., 285.
Eurystera flavatra, n. sp., 92.
Euscelis, synonymy of, 389.
Eustrophus repandus, 144.
Eutochia crenata, 143.
Eutreta simplex, n. sp., 425.
Eutylistus fallax, 91.
" tristriatus, 91.
Euura maculata, n. sp., 366.
" *minuta*, n. sp., 366.

Felt, E. P., article by, 286.
Fenusa, 365.
Field notes and questions, 295, 330.
Flea-beetle, turnip, 433.
" wavy striped, 433.
Florida Coleoptera, notes on, 61, 88, 140, 247.
Florida Lepidoptera, Drs. Barnes and McDunnough on, 179.
Fruit fly, Mediterranean, poisoned bait spray, for 243.
Funkhouser, W. D., articles by, 357, 403.

Galerucella decora. 10.
" luteola, 10.
" nymphea, 11.
Gastroidea polygoni, 6.
Geophilus rubens, 301.
Gerris marginatus, positive hydrotropism of, 33.
GIBSON, ARTHUR, articles by, 34, 300, 423.
GIRAULT, A. A., articles by, 174, 285, 288, 327.
Glossosoma penitus, n. sp., 202.
Glyptoscelis, 4.
Glyptotus cribratus, 142.
Gomphus abditus, n. sp., 347.
Goniocerus, parasitic on chrysopids, 308.
Gononotus lutosus, 251.
GRAENICHER, S., article by, 51.
Grylloblatta campodeiformis, n. sp., 94.
" n. gen., 93.
Grylloblattidæ, n. fam., 93.
Gynandromorphous lepidoptera, 331.
Gypona woodworthi, n. n., 389.

Hadena castanea, 402.
" illustra, 403.
Haltica schwarzi, n. sp., 141.
HANHAM, A. W., article by, 145.
HEATH, E. F., article by, 120, 300,
" obituary notice of, 299.
Helianthus, bees visiting, 409.
Heliodines nyctaginella, n. sp., 423.
" " larva of, 424.
Heliomata infulata, 295.
Helopeltis larvalis, 64.
Helorus, parasitic on chrysopids, 308.
Hemaris thysbe, var. cimbiciformis, 397.
Hemiptera, nomenclatural notes on, 377.
Hepialus macglashani, 395.
HEWITT, C. G., articles by, 1, 2, 15, 100, 147, 214, 219, 251.
Holocentropus interruptus, n. sp., 257.
" *longus*, n. sp., 258.
" *orotus*, n. sp., 257.
Homœosoma differtella, 31.
HOOD, J. D., article by, 57.
Hoplophorinæ, new S. American, 405.
Hormomyia bulla, n. sp., 286.
House Centipede, occurrence of in Canada, 219.
HUDSON, H. F., article by, 416.
Hydrophilus triangularis, life-history of, 337.
Hydroporus septentrionalis, life-history of, 37.
Hydropsyche partita, n. sp., 252.
Hydropsyche slossonæ, var. *recurvata*, n. var., 253.
Hydropsyche venularis, n. sp., 252.
Hydropsychidæ, key to tribes of, 204.
Hymenorus granulatus, 144.
Hyperodes hornii, 247.
Hypoderma bovis, occurrence in Canada, 1.
Hypodermodes solitaria, n. sp., 325.
Hypophlœus thoracicus, 143.
Imported Onion fly, use of poisoned bait spray for, 313.

Insects and pain, 269.
Insects of New Jersey, the destructive 322.
Ischnura cervula, nymph of, 355.
" verticalis, 355.
Isodromus iceryæ, parasitic on chrysopids, 306.
Isomira ignora, n. sp., 144.
" valida, 144.

JARVIS, T. D., article by, 35.
Jocara perseella, 31.
Julus, a new Californian, 314.
" *hesperus*, n. sp., 314.

Kincaidia, n. gen., 137.
KNAB, FREDERICK, articles by, 299, 325.

Labia bilineata, 275.
" equatoria, 275.
Labidura riparia, 274.
Larch seeds, a new Megastigmus reared from, 435.
LEHR, W., article by, 216.
Lema cornuta, 92.
LEONARD, M. D. (CROSBY, C. R. and) article by, 181.
Lepidoptera, gynandromorphous, 331.
" March captures of, 331.
" notes on Alberta, 393.
" stages in which winter is passed, 295.
Leptocella intervena, n. sp., 262.
" *stigmatica*, n. sp., 262.
Leptoceridæ, new American, 261.
Leptocerus angustus, n. sp., 263.
" *futilis*, n. sp., 264.
" *inornatus*, n. sp., 263.
" *retactus*, n. sp., 263.
Leptocoris, synonymy of, 379.
Leptocorisa, synonymy of, 379.
Lestes congener, nymph of, 191.
" disjunctus, nymph of, 195.
" lurinus, nymph of, 192.
" forcipatus, nymph of, 196.

Lestes, key to nymphs of, 190.
" nymphs of Canadian species of, 189.
" rectangularis, nymph of, 197, 349.
" uncatus, nymph of, 194.
" unguiculatus, nymph of, 194, 349.
" vigilax, nymph of, 198.
Leucochrysa luctuosa, n. sp., 26.
Leucorrhinia hudsonica, nymph of, 375.
Limnephilidæ, New American, 149.
Limnephilus æqualis, n. sp., 150.
" *argenteus*, n. sp., 152.
" *productus*, n. sp., 150.
" *secludens*, n. sp., 152.
" *spinatus*, n. sp., 149.
Lina scripta, 6.
Linotænia chionophila, 301.
Lixus amplexus, 248.
" *leptosomus*, n. sp., 249.
" *lupinus*, n. sp., 248.
London Biological Club, 184.
Longitarsus colulus, n. sp., 141.
Lucilia sericata, attacking a live calf, 416.
Lygæus, synonymy of, 381.
Lygus pratensis, an egg-parasite of, 181.
LYMAN, H. H., collections of, 408.
LYMAN, H. H., list of published papers, 225.
LYMAN, H. H., obituary notice of, 221.
Lypsimena fuscata, 92.

McDUNNOUGH, J. and BARNES, WM., article by, 27.
MACGILLIVRAY, A. D., articles by, 103, 137, 363.
McGREGOR, E. A., article by, 306.
Macrobasis torsa, 144.
Macronoctua onusta, eggs of, 296.
Macrophya confusa, n. sp., 139.
" *melanopleura*, n. sp., 139.
" *ornata*, n. sp., 139.
Macrosiphum coryli, n. sp., 48.
" *creelii*, n. sp., 41.
" *tiliæ*, 83.
" *venæfuscæ*, n. sp., 77.
Madarellus undulatus, 250.
MALLOCH, J. R., articles by, 113, 323.
Manatha nigrita, 179.
Manitoba, a new Elachistid moth from, 423.
MARCOVITCH, S., article by, 435.
MARLOFF, FRED, article by, 295.
MATHESON, R., articles by, 37, 185, 337.
Mediterranean fruit fly, poisoned bait spray for, 243.
Megachile, visiting sunflowers, 409.
Megastigmus laricis, n. sp., 435.
" table of species, 438.
Megilla fuscilabris *decepta*, n. var., 64.
Melanophila notata, 89.
Melissodes bishoppi, n. sp., 414.
" semiagilis, 413.
" suffusa, 414.
Melon fly, methods of controlling, 245.
Membracidæ, new S. American, 357.
Merinus lævis, 142.
Meromyza flavipalpis, n. sp., 117.
Mesembrine fly, a new, 325.
Messa, 365.
Metallus bethunei, n. sp., 366.
Metheisa sinuata, n. sp., 362.
Mexican Fruit fly, poisoned bait spray for, 310.
Micrasema charonis, n. sp., 266.
" *falcata*, n. sp., 265.
Molanna flavicornis, n. sp., 261.
Mormomyia vernalis, 263.
MORRIS, F. J. A., article by, 4.
Musca domestica, a new enemy of, 2.
Mymaridæ, a new Australian species of, 288.
Mymaridæ, notes on, 327.
Myriapods from Douglas Lake, Mich., 301.
Myzus circumflexum, 121.
" lycopersici, 123.

Nabis, type fixation of, 385.
Nadabius iowensis, 302.
Nampabius michiganensis, n. sp., 302.
NASH, C. W., article by, 297.
National Collection of Canadian Insects, a, 251.
Nehalennia carlota, n. sp., 347.
Neides, synonymy of, 380.
Neodiplotoxa, n. gen., 116.
Neogaurax, n. gen., 119.
Neoharmonia notulata, 65.
" venusta *dissimila*, n. var., 65.
Neolobophora ruficeps, 276.
Neomastix punctulatus, 249.
Neopus, characters of, 138.
Nepticula, *atlella*, n. sp., 21.
" apicialbella, 21.
" *chalybeia*, n. sp., 20.
" cratægifoliella, 17.
" *flavipedella*, n. sp., 19.
" latifasciella, n. sp., 18.
" N. American species of, 17.

Nepticula opulifoliella, n. sp., 22.
" *terminella*, n. sp., 23.
" *trinotata*, n. sp., 18.
Nesopeza gracilis, 157.
Nesopeza, n. gen., 157.
Neureclipsis signatus, 251.
Neuronia smithi, n. sp., 149.
NEWCOMER, E. J., article by, 67.
New Jersey, destructive insects of, 322.
Nomia, visiting sunflowers, 411.
Nothochrysa tibialis, n. sp., 26.
Novius cardinalis, 66.

OBITUARY NOTICES:
HEATH, E. FIRMSTONE, 299.
LYMAN, H. H., 221.
SAUNDERS, DR. WM., 333.
Odonata, new nymphs of, 349, 369.
" three new species of, 346.
Œcetina interjecta, n. sp., 262.
Œdionychus concinne, 141.
Olemira costalis, n. sp., 265.
Oligosita comosipennis, 328.
Olive fly, poisoned bait spray for, 277.
Ontario Agricultural College, Dept. of Entomology, 294.
Opatrinus aciculatus, 143.
Ophiogomphus sequoiarum, n. sp., 346.
Ora hyacintha, n. sp., 88.
Orthæa, synonymy of, 382.
Orthizema atriceps, parasitic in chrysopids, 308.
Orthoptera, new genus and family of, 93.
Otiocerus, synonymic note on, 387.

Pachnæus distans, 247.
Pachyrina flavonota, n. sp., 158.
" key to Japanese species of, 158.
" palloris, 159.
" *pullata*, n. sp., 160.
" *repanda*, n. sp., 162.
" virgata, 163.
Panthea virginaria, 398.
Papaipema lysimachiæ, n. sp., 70
" new species and life-histories in, 69.
" purpurifascia, 69.
Paragapetus mœstus, n. sp., 202.
" n. gen., 202.
Parajulus canadensis, 304.
" *dux*, n. sp., 304.
" venustus, 304.
Paranagrus optabilis, 327.
Parasitism of chrysopids in S. Carolina, 306.
PARKER, R. R., article by, 417,
Parnassius apollo, protection of, 109.
Parnidæ, life-history notes on two, 185.
Pasimachus strenuus, 62.
Perdita albipennis, 53.
" bruneri, 54.
" canadensis, 52.
" citrinella, 55.
" gerhardi, 56.
" lacteipennis, 52.
" maculipennis, 54.
" maura, 54.
" pallidipennis, 53.
" visiting sunflowers, 410.
" Wisconsin species of, 51.
Perigenes, status of, 382.
Perilampus, parasitic on chrysopids, 308.
Perillus, synonymic note on, 378.
Phalangid drinks milk, A, 120.
Philænus, synonymic note on, 388.
Philopotamus, characters of, 253.
Phyllobrotica discoidea, 10.
Phyllotreta robusta, 142.
" sinuata, 433.
" vittata, 433.
Phylocentropus vestitus, 256.
Phymata, synonymic notes on, 384.
Pinacodera platicollis, 63.
Plateros flavoscutellatus, n. sp., 89.
Platydema subquadratum, 143.
Platœceticus gloveri, 179.
Plectrocnemia adironica, n. sp., 256.
" canadensis, 256.
" cinereus, 256.
Plusia æroides, 145.
" metallica, 145.
Plusiidæ, sunflowers as lure for, 145.
Poisoned bait spray, for controlling fruit-flies, 243, 277, 309.
Poisoned bait spray, mixed treatment, 309.
Polycentropus centralis, n. sp., 258.
" confusus, 258.
Polydesmus serratus, 306.
Polyselandria, n. gen., 104.
Polyzonium rosalbum, 303.
Pontia rapæ, early appearance of, 330.
Porphyraspis cyanea, 142.
Prasocuris, 6.
Prionomerus calceatus, 249.
Prochalia pygmæa, 179.
Proctotrypoid egg-parasites of sugar-cane insects, 293.
Profenusa collaris, n. sp., 364.
" n. gen., 364.
Prohippelates, 119.

Prolabia annulata, 275.
" arachidis, 275.
" formica, 275.
" mexicana, 275.
Prosopothrips cognatus, n. sp., 57.
Psalis americana, 274.
Psephenus lecontei, life-history notes on, 185.
Pseudochlorops, n. gen., 119.
Pseudohippelates, 119.
Pseudoselandria, n. gen., 103.
" *oxalata*, n. sp., 104.
Psiloneura mœsta, n. sp., 264.
" n. gen., 264.
Psychidæ, 29.
Psychomyia diversa, n. sp., 253.
Psyllobora elegans, 142.
" 20-maculata *pallidicola*, n. var., 65.
Pterocolus ovatus, 247.
Pterostichus faber, 62.
" morio, 62.
Purex frontalis, 274.
" parvicollis, 274.
Pyractomena borealis, 90.
Pyragra fuscata, 273.

Queensland, a new fossorial wasp from, 271.

Reduvius, synonymic notes on, 384.
Rhabdocnemis obscurus, notes on, 174.
Rhagoletis cingulata, 311.
" fausta, 311.
" pomonella, 310.
Rhinomacer pilosus, 247.
Rhipidandrus fulvomaculatus, 91.
Rhodobæus 13-punctatus 5-punctatus, 250.
Rhopalosiphum howardii, 165.
Rhyacophila acropedes, 201.
" *bifila*, 201.
" *bipartita*, 201.
Rhyacophilidæ, notes on American, 201.
Rhyncholophus sp., occurrence on Lepidoptera of, 332.

Salda, synonymic notes on, 386.
Saldula, n. n., 387.
Sarcophaga cooleyi, n. sp., 417.
Sarcophagid scavenger, a new, 417.
Saropogon oblitescens, n. sp., 102.
Sawflies, new genera and species of, 363.
Sawfly, new fossil, from Florissant, 32.
Scarites californicus, 62.
Scatophaga, predacious habits of, 2.
" stercoraria, 2.
Scelionidæ, new Australian genus of, 60
" ring-joints in Australian, 164.
Sciapus chalybeus, n. sp., 390.
" crinitus, 390.
" digitatus, n. sp., 391.
" flavipes, 390.
" forcipatus, 389.
" nigrimanus, n. sp., 392.
" notes on, 389.
Sciomyza apicata, 324.
" strigata, 324.
Sciomyzidæ, synonymical notes on, 323.
Schizopelex hesperus, n. sp., 266.
Scutigera forceps, occurrence of in Canada, 219, 297.
Selenophorus fossulatus, 63.
Senta defecta, 401.
Sericostomatidæ, new American, 265.
Sepedon macropus, 323.
SEVERIN, H. P., articles by, 243, 277, 309.
Sicya macularia, var. *lewisi*, n. var., 291.
Simplemphytus, n. gen., 363.
" *pacificus*, n. sp., 363.
Siphunculina, 119.
SLADEN, F. W. L., article by, 73, 109.
Smiliinæ, new S. American, 362.
Sonibius bius, 302.
Sparatta nigrina, 276.
Sphenophorus inæqualis, 250.
" minimus, 250.
" retusus, 250.
Sphingidæ at sugar, 296.
Sphinx pinastri, 398.
Spirobolus marginatus, 304
Spongophora croceipennis, 274.
Spongovostox alter, 275.
" apicedentata, 275.
" ghiliani, 275.
Stamnodes pearsalli, n. sp. 289.
Stenelmis bicarinatus, life-history notes on, 188.
Stenophylax flavata, n. sp., 154.
" *hesperus*, n. sp., 152.
Stenoptycha solanis, 31.
Stethynium cinctiventris, n. sp., 288.
Stictocephala, type fixation of, 388.
Storteria unicolor, 31.
Sugar-cane insects, egg-parasites of, 293.
Sunflowers, bees visiting, 409.
SWETT, L. W. I., article by, 289.

Symdobius albasiphus, n. sp., 226.
Sympetrum pallipes, nymph of, 373.

Tabanidæ, four new, 343.
Tabanus beatificus, n. sp., 344.
" *birdici*, n. sp., 343.
" *milleri*, n. sp., 344.
Tachygonus lecontei, 250.
Talanus langurinus, 143.
" *okeechobensis*, n. sp., 143.
Tarnished plant-bug, an egg-parasite of, 181.
Telenomus saccharalis, n. sp., 293.
Tenthredella toddi, n. sp., 32.
Tenthredinidæ, new genera and species of, 103, 137.
Tenthredinidæ, note on food-habits of, 121.
Tenthredo neoslossoni, n. sp., 138.
Tetanocera lineata, 324.
Tetralopha querciella, 31.
Thamnotettix januata, n. sp., 213.
" *pasadena*, n. sp., 212.
" two new California, 211.
Thomas, F. L., article by, 425.
Thysania zenobia, 300.
Thysanopteron, a new N. American, 57.
Ticida, synonymic note on, 387.
Tipula aino, n. sp., 209.
" coquilletti, 206.
" *insulicola*, n. sp., 211.
" japonica, 205.
" key to Japanese species of, 205.
" mikado, 205.
" nipponensis, n. sp., 236.
" *præpotens*, 205.
" parva, 205.
" *serricauda*, n. sp., 237.
" *yamata*, n. sp., 208.
" *yusou*, n. sp., 240.
Tipulidæ, Japanese, 157, 205, 236.
Toronto Branch, meetings of, 135.
Tragopa decorata, n. sp., 407.
" *luteimaculata*, n. sp., 406.
Tragopinæ, new S. American, 406.
Triænodes dentata, n. sp., 261.
Trichogramma minutum, 329.
Trichogrammatidæ, notes on, 327.
Trichogrammatoidea nana, 327.
Trichoptera, American, 150, 201, 252, 261.
Trigona carbonaria, visiting sunflowers, 413.
Trirhabda canadensis, 10.
Trogoderma fascifera, n. sp., 66.
Tropidoseyta binotata, n. sp., 359.
" *brunneidorsata*, n. sp., 357
" *maculata*, n. sp., 360.
Trypetidæ, three new Colorado species of, 425.
Turuptiana permaculata, 398.
Tyloderma punctata, 250.

Ufens niger, 328.
Urellia apicata, n. sp., 428.

Van Duzee, E. P., article by, 377.
Van Duzee, M. C., article by, 389.
Vanessa californica, the case of, 67.
Venables, E. P., article by, 121.
Vlax toltecus, 276.
" intermedius, 276.
Vostox insignis, 274.
" similis, 274.

Walker, E. M., articles by, 93, 111, 189, 258, 260, 349, 367, 368, 369, 429.
Wasp from Queensland, a new fossorial, 271.
Wasp from the Philippine Islands, A new, 220.
Webster, F. M., article by, 100.
Weiss, H. B., articles by, 33, 269, 322.
Whitney, C. P., article by, 343.
Winn, A. F., article by, 109, 295, 296, 331.

Xanthonia, 4.
Xenoglossodes helianthorum, n. sp., 415.
Xylomyia moratula, n. sp., 101.

Zoyphium crassicorne, n. sp., 271.

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